Elizabeth City State University

Nurturing ECSU Research Talent (N.E.R.T.)

2000-2001 Annual Report

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Contained in this report are the following:

1. Executive summary of program activities.
2. GRE/GPA Data
3. Summer 2000 internship research abstracts
4. Summer 2001 internship placements
5. Academic Year 2000-2001 research team final reports
6. Graduate success report
7. Visiting Lecture Program highlights

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N.E.R.T.

Nurturing ECSU Research Talent
Elizabeth City State University

This program, entitled "Nurturing ECSU Research Talent" focuses on undergraduate education and undergraduate research experiences. Nurturing these young researchers is a primary concern. Highest priority is given to providing them with the guidance and skills to insure their entrance and success in graduate school. Further, each student learns the fundamentals of scientific research, in a team setting, under the guidance of a faculty mentor. Program activities are as follows:

1. Student development activities

   a) Recruitment of high ability minority students;
   b) Providing a precollege/summer experience for recruited students;
   c) Providing research experiences;
   d) Providing a mentor, graduate school counseling and GRE preparation;
   e) Providing funds for student travel.
   f) Providing financial support for students in the form of research scholarships;

2. Infrastructure activities

   a) Enhancement of current computer graphics and operating systems courses;
   b) Development of a new course in computer visualization;
   c) Establishing a visiting lecture series in computer science;
   d) Providing UNIX network management support;
   e) Acquisition of computer equipment appropriate to support of research training.

Executive   Summary

This report documents the 2000-2001 activities of the Nurturing ECSU Research Talent Program. The NERT program is supported by three active grants. The parent grant number is N0014-99-1-0990 (phaseout funds through 7/31/2002). The summer program, involving internships and on-campus research training, is supported by the AASERT grant #N00014-97-1-0650(funded through 6/01/2000). During the 2000-2001 academic year all new students in the program were supported by the NERT-2003 grant no. N00014-98-1-0749 (funded through 7/30/2003). The program activities are documented on the World Wide Web at http://nia.ecsu.edu/onr/onr.html.

The 2000-2001 Office of Naval Research Nurturing ECSU Research Talent program involved 28 undergraduates, mathematics, computer science, physics, and technology majors. Research training meetings began September 7, 2001 and were held every Tuesday and Thursday through April 17, 2001. Meetings were conducted from 5-8 pm. Research training meetings start with a 20-30 minute announcement period during which time students learn about internship opportunities, hear program announcements, give team reports, discuss travel logistics and goals of the program. Following the announcement period, students meet with faculty mentors or attend training on tools used for research. The closing program was held on two nights in April. During the closing program, students made oral presentations of their research training activities. All research teams were also required to complete written reports. Copies of the written reports are included. In addition, students spend 20 hours/week in the undergraduate research computer laboratory completing task sheet requirements and research assignments.

The program this year resulted in 2 out of 2 of the graduating seniors being admitted to graduate school with fellowships. One student is scheudled to graduate in December of 2001. Statistics on GPA and Enrollment Statistics can be found on page 3.

Summer internship placement was also impressive including: The Naval Research Virtual Reality Laboratory, Fermi National Accelerator Laboratory, Federal Aviation Association, ONR Ocean/Marine Science Undergraduate Research Experience, University of Wisconsin Visualization Program,Institute in Computational Science-Scientific Visualization, SCSU Research Institute in Astrophysics, and Univ. of Wisconsin Visualization Research Program. Internship abstracts for 2000 are included in this report. A listing of summer 2001 internship placements is included in this report.

Executive Summary

A total of $108,000.00 in scholarships was awarded during academic year 00-01. An additional $11,000.00 was awarded through the Graduate Success Program to support program alumni who are pursuing graduate degrees. With respect to the Graduate Success Program, two students completed a Masters of Science degree in computer science from North Carolina A&T University. One student completed the Masters of Science degree in Mathematics at Hampton University and two completed the Masters of Science in Physics at Hampton University.

Students presented their research activities at several undergraduate research conferences including, the Seizing Opportunities to Advance Research (SOAR) on the campus of North Carolina A & T University, and NAFEO High Tech Expo in Washington DC. In addition, juniors attended the Graduate School Focus Program on the campus of Georgia Tech, while seniors attended the Graduate Record Examination Forum in New York. All juniors and seniors registered for and took the Graduate Record Examination (GRE).

Fourteen of the program participants received the ONR-NERT Research Program Award (certificate plus $50.00) for having a 3.0 or above cumulative or current GPA in 30 or more hours of coursework. Six students received the ONR-NERT Research Scholars Award (certificate plus $100.00) for having a 3.0 or above cumulative and current GPA in 30 or more hours of coursework. Two students received the ONR-NERT Award of Excellence (certificate plus $1000.00) . Each met the requirement for having a 3.0 GPA and having been awarded a fellowship and admission to a graduate program for Fall'01. Included in the appendix is a copy of the Honors Convocation program which list not only the awards described but also a list of those students who made the Chancellor's List, Vice Chancellor's List, and Honor List .

Dr. Johnny Houston, professor of mathematics and computer science, arranged the visiting lecture series during 2000-2001. The visiting lectures were members of the faculty of 6 Historically Black Institutions and 2 international universities. A list of visiting lectures and topics follows.

Math & CS Department — Visiting Lecture Program

Dr. Johnny Houston, Coordinator

Shared Memor and Message Passing Architectures
R. L. Boehning. Professor
California State University/San Marcos
April 19, 2001

•

Space Flight
Katheryn Clark ,NASA's Space Station Chief Scientist
May 1, 2001

•

High Frequency Devices in Communication Systems
Dr. Monty Andro ,Digital Signal Processing Laboratory Engineer
NASA's John H. Glenn Research Center
September 28, 2000

•

"Combinatorial Optimization Problems"
Dr. Earl R. Barnes, Professor
Georgia Tech
August 2000

•

Spacelab
Lawrence J. DeLucas (O.D., Ph.D) NASA Payload Specialist
March 20, 2001

1

2000-2001 Graduate Success Report

Name	University	Degree Sought/Earned
Anderson, Melvin	NCA&T/ODU	MS in CS (now working on Ph.D)
Archer, Darnley	ODU	MS in CS
Banks, Belinda	NSU	MS in Communication
Basnight, Renee	Hampton Univ.	MS in CS
Bowser, Felicia	NC State	MS in CS
Bright, Teresa	Ohio State	MS in CS
Brown, Michelle	Hampton Univ.	MS in CS
Charity, Donald	Howard Univ.	MS in Math
Creekmore, Santiel	Hampton Univ.	MS in Physics
Felton, Curtis	NCA&T	MS in CS
Felton, Karen	NCA&T	MS in Chem
Fields, Courtney	NCA&T	MS in CS
Fenner, Auther	NCA&T	MS in Math
Fields, Michael	Hampton Univ.	MS in Physics
Fofana, Abdula	Howard Univ	MS in CS
Gale, Joseph	Old Dominion U.	MS in CS
Gardner, Bonnie	Univ. of Maryland	MS in CS
Gatling, Charles	NCA&T	MS in CS
Gayle, Chonda	Hampton Univ.	MS in CS
Gordon. Kim	Virginia State	MS in Math
Hayden, Kuchumbi	NCA&T	MS in CS
Harrell, Jovita	Hampton Univ.	MS in CS
Harrison, Keisha	Univ. of Maryland	MS in Geoscience
Howard, Ervin	East Carolina U.	MS in Ed. Technology
Jones, Alicia	Howard Univ.	MS in CS
Jones, Clarence	Hampton Univ.	MS in Physics
Jordan, Brian	Hampton Univ	MS in Math
Joyner, Sheri	Howard Univ.	MS in CS
Koltuniak, Eva Dail	Hampton Univ.	MS in CS
McCray, Tim	Hampton Univ.	MS in CS
Mcfadden, Stacia	Michigan State	MS in CS
Monk, Cultilda	Fayetteville State	MS in Math Education
Moore, Ayonda	American Univ	MS in Statistics
Saunders, Sharon	Hampton Univ.	MS in CS
Thomas, Cathy	Ohio State	MS in CS
Vaughan, Stephanie	Hampton Univ.	MS in CS
Williams, LaVerne	East Carolina U.	MBA

Summer 2001 Internship Report

Student	Major	GPA Cur	GPA Cum	Placement
Freshmen				
Gilchrist, Willie II	CS	3.59	3.59	Naval Research Laboratory - Vritual Reality Lab
Harrell, Paula	CS	3.77	3.77	SCSU Research Institute in Astrophysics
Keys, Casey	CS	3.69	3.69	Summer School - ECSU
Rascoe, Elizabeth	CS	3.69	3.69	Federal Aviation Association - FAA
Reid, Shawneque	Math	3.60	3.60	SCSU Research Institute in Astrophysics
Seward, Carl	Math	3.81	3.81	ONR Ocean/Marine Science URE
Smith, Eunice	Math	4.00	4.00	Fermi National Accelerator Laboratory
Veale, Nelson CS	Phy	3.41	3.41	Adv Undergrad Research Using Optical Radiation
Vincent, Andrew	CS	3.06	3.06	ONR Ocean/Marine Science URE
Sophomores				
Bah, Ramatoulie	Phy	3.29	3.68	SCSU Research Institute in Astrophysics
Banks, Katrina	CS	3.07	2.98	SCSU Research Institute in Astrophysics
Brooks, Shayla	CS	2.94	3.16	ECSU Ronald McNair Research Program
Creekmore, Torrie	CS	2.80	3.22	Center for Materials Research URE at NSU
Davis, Vincent	phy	3.81	3.94	URE in Astrophysics-Touson
Newby, Golar	CS	3.55	3.59	Naval Research Lab -Virtual Reality
Juniors				
Mattocks, Melvin	CS	2.50	3.25	University of Wisconsin Visualization Program
Seniors				
Gale, Joseph	CS	3.29	3.01	ODU - NASA Harriett Jenkins Fellowship
Walker, Ernest	CS	3.53	3.41	ONR Ocean/Marine Science URE
Harrison, Keisha	CS	3.06	3.28	University of Maryland - Fellowship

N.E.R.T.

Nurturing ECSU Research Talent
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Geospatial Visualization for Transportation Engineering: Interpreting the Best Location for an Interstate Highway Truck Safety and Weight Enforcement Facility

Researcher: Keisha Harrison, SR/CS
Mentor: Dr. Timothy Olsen,
Univ. of Wisconsin- Madison, ARC

Keisha became a member of the remote sensing commercialization NASA-supported Affiliated Research Center (ARC) project team when she arrived and began to work on visualizations developed from digital elevation models (DEMs) downloaded from the US Geological Survey (USGS), Landsat-7 multi-spectral data from July of 1999 and county aerial orthophotography These visualizations were created to be used for planning and decision-making by a engineering firm con-tracted to the DOT. The goal was to select the best site for a new Safety and Weight Enforce-ment Facility along a section of Interstate-90. The visualization challenge was to present complex geospatial data meaningful to deci-sion-making in a manner that would enhance engineering decisions and enable meaningful participation by the general public during open hearings. As part of an ARC project, the fly through visualizations contributed towards the commercial viability of remote sensing data and technology.

Three Dimensional Models From 2-D Photos

Researcher: Golar Newby, SO/CS
Mentor: Edward Swan II, ONR
Naval Research Lab

The internship project at the Naval Research Labora-tory involved researching the development of 3 Dimensional models from 2 Dimensional pictures. Software packages used include, but are not limited to are Canoma by Meta Creations and Photo Mod-eler Lite which is developed by EOS Systems Inc. The purpose of this research is to find ways to form accurate 3D models that can be measured for errors and measured for length given a certain scale. The model should then be able to be saved in an Open GL format or VRML formate so that another com-puter can understand the geometry and texture of the 3 dimensional object. The project also involved study of the most common type of lens distortion encountered, barrel type. Barrel lens distortion causes the image to bend out which causes the image to curve much the same way as a barrel. With the evaluation of Canoma and Photomodeler Lite I was able to determine that Photomodeler Lite was geared much more towards the project and would better benefit someone modeling. With the upcoming release of Photomodeler Pro 4.0 it would better benefit the project.

Investigations of a Toy Model of Dark Matter Clustering

Researcher: Shayla Brooks, SO/CS
Vincent Davis, SO/Physics
Mentor: Dr. Donald K. Walter, Center for Network Research & Training (CNRT) at SCSU

The growth of dark matter clusters in the early universe is investigated by using a two-dimensional toy model developed by Krauss and Starkman. The model is implemented in the Mathematica software so that the variation of model parameters can be understood visually. Effects investigated include expansion, growth of the horizon, and free-streaming. Because dark matter is thought to be the seeds for the formation of galaxies, the correlation function for a set of model parameters is calculated and compared with that determined from an actual galaxy catalog. The project also included understanding Optical Astronomy, Stars, ASTROIP, UNIX.

Light Detection and Ranging (LIDAR) Technique for observation and Location of Greenhouse and Trace Gases.

Researcher: Torreon Creekmore, SO/CS
Mentor: Dr. Thomas Chyba, Research Center for Optical Physics, Hampton University

Light Detection and Ranging (LIDAR) is a powerful tool for understanding and studying the Earth's atmosphere. The use of lasers in remote sensing helps scientist to take advantage of the unique attributes of laser light to measure properties of the Earth's atmosphere. LIDAR consists mainly of a laser, telescope receiver, and computer data analysis system. Within this research project experiments were performed to demonstrate the fundamentals of lasers. A new

pulse laser was characterized and evaluated for use in a mini-LIDAR system. A small telescope and computer data acquisition system were used to make preliminary measurements. The project started with hard target measurement and proceeded to aerosol measurements. Part of the project involved aligning a plasma tube containing Helium-Neon gas and two resonator mirrors to make a laser.

A Study of the Spiral Galaxy M101

Researcher: Katrina Banks, SO/CS
Issac Lister, SR/Math
Mentor: Dr. Donald K. Walter, Center for Network Research & Training (CNRT) at SCSU

Summer research involved investigation of the spiral galaxy M101. The task included processing and examining images of this object taken from the ground using narrow-band interference filters centered on wavelenghts of several bright nebular emission lines. The study also included examining emission from both high and low ionization ions, O++ and N+ respectively. The presence of HII regions in the arm as well as the ionization structure across the galaxy is discussed

Long-term Nearshore Field Experiment

Researcher: Earnest Walker, SR/CS
Mentor: Dr. H. Pendharkar,
ECSU Math & Computer Science Dept.

The Long-Term Nearshore Field Experiment is an ongoing project to implement a web-based data-handling system to compile and archive primary data sets from the DUCK94 field re-

search facility. DUCK94 data is the most comprehensive measurement of the dynamic nearshore data ever collected. In alliance with scientist worldwide, it addresses effects of the ocean carbon cycle on the atmosphere—utilizing total of 19 organizations conducts 31 experiments involving 100 scientist, technicians, and students. The focus of the Elizabeth City State University team of the Mathematics and Computer Science Department in partnership with the Coastal Hydraulics Laboratory Field Research Facility was to make the accumulated data available online in useful online formats.

Focusing the data of small and medium scale sediment transport, morphology, wave shoaling, wave braking, nearshore circulation and sediment motion accomplished this task. The team's ultimate goal was to transform the data collected from its original state to a format utilizing Perl, Matlab, and HTML. Once the appropriate format was conformed, it was then placed on the JGOFS server for Internet use.

A Study of North American Monsoon System (NAMS) Using SuperCalc4.

Researcher: Joseph Gale SR/CS
Mentor: Dr. Wayne Higgins
               Howard University

The North American Monsoon System (NAMS) greatly affects climate variability in the continental United States. Finding out exactly how the NAMS affects the climate will allow better prediction of future climate conditions. It is imperative that the NAMS is further researched in order to establish its climate predictability value. Precipitation and surface temperature data has been collected from weather stations all over Mexico for the years of 1990 to 2000. This data will be combined with that of the Southwest U.S., of the same time period, to be analyzed. The raw data was received in .cal and .csv format. The .cal files are converted to .csv files using an application called SuperCalc4. Using another application all of the files were converted to .asc format. A C-program was designed to scan through each file searching for missing values to be replaced and create a new file, which was in a more proper format for analysis. The data was processed using the Cressman Analysis technique.

Methods of Solving Systems of Equations

Researcher: Melvin Lee Mattocks, JR/CS
Mentor: Johnny L. Houston, PhD
ECSU Math and Computer Science Dept.

A system of equations is written in the form

$$a11x1 + a12x2 + a13x3 + a1nxn = b1$$
$$a21x1 + a22x2 + a23x3 + a2nxn = b2$$

$$. \quad . \quad . \quad .$$

$$an1x1 + an2x2 + an3x3 + annxn = bn$$

where aij represent the coefficients of the system, bi represents the right-side elements of the systems, and x1, x2, x3,. . ., xn represent the unknowns. To simplify the system we can write it in matrix-vector form. The coefficients aij can be used to form an n x n matrix, where there are n columns and n rows. The unknowns, x1, x2, x3,. . ., xn, along with the right-side elements bi, can be placed in an m x 1 matrix. This system of equations can be rewritten as $Ax = b$, where A is the matrix of the coefficients, x is the matrix of the unknowns, and b is the matrix of the right-side elements. A solution for this system is a set of specific values for x1, x2, x3, . . .,xn that will make each of the equations a true equality. Systems of equations are solved by many methods. The Gaussian Elimination method is the most well known. This project, investigates the Gaussian Elimination method as well as some specialized methods such as LU (Lower Upper) factorization and Cramer's Rule, as well as some iterative methods such as the Jacobian Method, Gauss-Seidel Method, and the S.O.R. (successive over-relaxation) Method. Computer programs in C++, to solve the equations, were also developed for each of the methods.

VRML and *.wrl Class Files

Researcher: Je'aime Powell SR/CS
Mentor: Simon Julier, ONR Naval Research Lab

The task involved creation of a working API which will automatically convert files from VRML class files into OpenGL linklists or C code files for implementation into the GRATO. OpenGL is a cross platform graphics rendering package. It is mostly used for ultra realistic landscapes. The GRATO uses OpenGL to display both reality based landscapes and any man made added features. Specific on the GRATO can be found at the AIT web site which is http://www.ait.nrl.navy.mil. The most common OpenGL seen by users can be found in Direct X enhanced games for the PC. It is a very powerful package. The OpenGL website (http://www.opengl.org) served as a reference on the powerful package and implementation of software development. The research continued with a focus on the functions of VRML and its *.wrl class files. One main difference between OpenGL and VRML is the way the textures and object are defined. VRML has shapes built in while OpenGL's linked lists are long an cumbersome sets of instructions. One program was identified with the ability to import wrl files and export c files which can be compiled and run using OpenGL. The program's name is "3D Explorer" by Xdsoft.

Dr. Hayden is shown with researchers during UNIX Operating System Training.

Development of an e-mail Notification for Wireless

Researcher: Katrina Godwin, GRAD/CS
Mentor: Joann Ordille, Lucient Technologies- Bell Labs

The research project focused on wireless technology and the construction of an e-mail notification program in the C programming language for UNIX that could be used for wireless application. Circular buffers were investigated as well as Bluetooth wireless technology. A circular buffer program was written to prepare for the e-mail notification program. The e-mail notification program was designed to perform a search for a keyword in the Associated Press newsfeed. Once the keyword was found in an article, an e-mail notification with the title of the article was sent to a specific e-mail address. The program used the UNIX Mail command and the system() function. Katrina is now a graduate student at Howard University.

Three - Dimensional Battlefield Simulation of Realtime Kosovo (1999)

Researcher: Donald Charity, GRAD/Math
Mentor: Dr. Rob King, ONR-NRL

With the Kosovo crisis, the project assigned for research was a Three - Dimensional battlefield simulation of realtime Kosovo. This project will be used for demonstrations at NRL's Virtual Reality Lab. The tools used to complete this project were MultiGen II, a realtime 3D modeling software used to generate the terrain, ARC Digitized Raster Graphics, satellite collected images of the Kosovo terrain, DTED Digital Terrain Elevation Data on CD-ROM, along with several other application programs used to generate the desired terrain for viewing. Donald is now a graduate student at Howard University.

2000 - 2001 PHOTO HIGHLIGHTS ...

The Office of Naval Research-Nurturing ECSU Research Talent program involves undergraduate mathematics, computer science, physics, and technology majors in academic year team research activities. Research training meetings began in early September and were held every Tuesday and Thursday 5-8 PM through Mid April. Research training meetings start with a 20-30 minute announcement period during which time students learn about internship opportunities, hear program announcements, give team reports, discuss travel logistics and goals of the program. Following the announcement period, students meet with faculty mentors or attend training on tools used for research. In addition, students spend 20 hours/week in the undergraduate research computer laboratory completing task sheet requirements and research assignments. The closing program is held on two nights in April. During the closing program, students make oral presentations of their research training activities. All research teams are also required to complete written reports and to maintain a team webpage. Shown above are scenes from the announcement period and Dr. Stephanie Johnson (student advisor). Shown below are scenes from the research training.
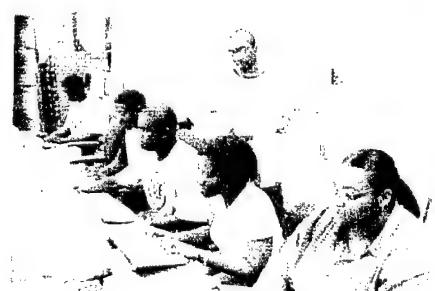
2000 - 2001 ENTERING FRESHMEN

Seward, Carl   Smith, Eunice   Booth, Cedric   Harrell, Paula

Blakeney, Dionne   Gilchrist, Willie II   Lee, Kenyatta   Fleetwood, Darius

Reid, Shawneque   Veale, Nelson   Griffin, William   Turner, Patrice

ates to   emember.....

* **HTML Training Sept. 14 & 19, 2000**
* **Women Of NASA Satellite Webconference Sept. 27, 2000 and Oct. 5, 2000**
* **Photoshop Training Oct. 3 & 5, 2000**
* **ETS Graduate Record Examination Workshop Oct. 5-8, 2000**
* **Celebration of Women in Mathematics Oct. 17, 2000**
* **National Technical Association Conference & Career Fair, Oct. 18-21, 2000**
* **UNIX OS Training Oct. 10 & 19, 2000**
* **ECSU National Training Conference Oct. 23-25, 2000.**
* **Satellite Imagery Training Oct. 24, 26, 31 and Nov. 2, 2000**
* **Election Day Nov. 7, 2000**
* **Internship Roundtable Nov. 9, 2000 2 - 3:30 PM 116 LH**
* **Report on assigned research articles Nov. 30, 2000**
* **GaTech Graduate School Focus   Jan. 13 - 16, 2001**
* **Association for Computing Machinery SIGCSE Conference Feb. 21-25, 2001**
* **NAFEO High Tech Undergraduate Research Expo March 19-24, 2001**
* **Final Research Team Oral Reports Apr. 12 and 17, 2001 5-6:30pm 116 Lester Hall**

2000 - 2001 UNDERGRADUATE STUDENT RESEARCHERS

Joseph
Gail sr/cs

Keisha
Harrison sr/cs

Ernest
Walker sr/cs

Issac Lister
sr/math

Je'aime
Powel sr/cs

Davis, Vincent
so/physics

Bernard
Bailey jr/tech

Gregory
Lassiter jr/cs

Melvin
Mattocks jr/cs

Gregory
Williams Jr. so/cs

Elizabeth
Rascoe so/cs

Loretta
Barnes jr/cs

Golar
Newby so/cs

Torreon Creekmore
so/physics

Katrina
Banks so/cs

Shayla
Brooks so/cs

Ramatoulie Bah
so/physics & cs

2000 - 2001 RESEARCH MENTORS

Top-Left Dr. Hemant Pendarkar (System Administration), Mrs. Wanda Hathaway (Visualization). Bottom-Left Dr. Linda Hayden (PI), Mr. Jeff Wood (Multimedia). Seated are Mr. Robert Harris (Networking), Mr. James Swimpson (scholarships), Dr. Latif Choudhury (Physics).

2000-2001 RESEARCH TEAMS ...

Team Name	Mentor(s)	Team Members
System Admin	Dr. H. Pendharkar	Golar Newby, SO/CS
		Patrice Turner, FR/CS
		Willie Gilchrist, FR/CS
		Paula Harrell FR/CS
Satellite Imagery	Mrs. W. Hathaway	Keisha Harrison, SR/CS
		Cedric Booth, FR/CS
		William Griffin, FR/CS
		Dionne Blakeney, FR/CS
		Elizabeth Rascoe, SO/CS
Networks	Mr. R. Harris	Joseph Gale, SR/CS
	Dr. L. Hayden	Gregory Lassiter, JR/CS
		Ernest Walker, SR/CS
		Loretta Barnes, JR/CS
		Gregory Williams, SO/CS
Mathematics	Dr. G. Lawrence	Carl Seward, FR/Math
	Dr. L. Hayden	Shawneque Reid, FR/Math
		Eunice Smith, FR/Math
		Kenyatta Lee, FR/Geoscience
		Issac Lister SR/Math
Physics	Dr. L. Choudhury	Torreon Creekmore, SO/Phy
		Vincent Davis, SO/Phy
		Ramatoulie Bah, SO/Phy & CS
		Katrina Banks, SO/CS
		Nelson Veale, FR/CS
		Darius Fleetwood, FR/Phy
Multimedia	Mr. J. Wood	Je'aime Powell, SR/CS
	Mrs. B. Washington	Bernard Bailey, JR/Tech
		Shayla Brooks, SO/CS
		Melvin Mattocks, JR/CS

Office of
Naval Research

For more information visit our website
http://nia.ecsu.edu/onr/onr.html
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2000-2001 Enrollment & GPA Report

Major Discipline	Number of students enrolled at school (by year)				Number of students enrolled in ONR Program (by year)				Number of Students Graduated		Number of Graduate Professional School	
	FR	**SO**	**JR**	**SR**	**FR**	**SO**	**JR**	**SR**	**Total**	**ONR**	**Total**	**ONR**
Chemistry	1	1	1	7	0	0	0	0	3	0	1	0
Computer Science	71	43	41	37	7	5	3	2	28	2	2	2
Mathematics	7	3	2	11	3	0	0	1	7	1	3	1
Physics	1	3	0	0	0	2	0	0	0	0	0	0
Totals	80	50	44	55	10	7	3	3	38	3	6	3

	Mean GPA for all	Mean GPA for ONR
Freshman	2.30	3.37
Sophomore	2.57	3.48
Junior	2.63	3.24
Senior	2.87	3.18
Total	2.60	3.32

ONR GRE average score: 1290

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- Final Research Team Reports
- Highlights and Photo Pages
- Honors Convocation Program

Physics Research Team *2000-2001*

Team Mentor:
Dr. Latif Choudhury

Team Members:
Torreon Creekmore
Vincent Davis
Ramatoulie Bah
Katrina Banks
Nelson Veale

TUNNELING OF A MATTER WAVE THROUGH A DELTA FUNCTION TYPE OF BARRIER

R. Bah, K. Banks, T. Creekmore, V. Davis, N. Veale, A. Vinson.*

April 12, 2001

Abstract

The Schroedinger equation was set up for a matter wave with non-zero mass with a positive rigid delta function potential sitting at the origin. A wave starting from the left side of the origin should classically be forbidden to penetrate through the rigid delta function type of the wall. However, the equation for the matter wave can be solved for both regions left and right rigorously. The spectral relation of the delta function was used. The property of the delta function that if it is multiplied by a reasonable function, retains only the value at the point where the argument of the delta function vanishes has been utilized. This result can be obtained from the theory distributions. Since we are dealing with only one dimensional case, we arrive at a differential equation which is inhomogeneous and of second order. Since we are only looking for scattering we assume the energy of the system is positive. We get a plain wave solution for the homogeneous part. The particular solution can be obtained by using the residue theorem of complex analysis for both the left and right hand side of the x-axis separately. We then match the solutions according to the quantum mechanical prescription. We find that the results are completely identical. This can be interpreted as follows: the left hand solution completely tunnels through the potential barrier to the right hand side of the origin.

1   Introduction

Quantum tunneling is a well-known phenomenon in quantum mechanics. If we construct a barrier along the path of a wave, a portion of the wave bounces back forming the reflected wave and another portion is transmitted through the barrier. If the barrier is high enough, classically one expects that all of the wave should be bounced back. But if we solve a quantum mechanical problem we always come across a phenomenon called quantum tunneling through a classical barrier. If we now introduce a barrier of a positive delta function type, classically it represents an infinite wall. According to our intuitive concept, a wave which originates at the left hand side should not be able to penetrate through the wall. We shall show in this paper that according to quantum mechanical formulation, this wall does not behave as a wall at all.

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*Mentor: Latif Choudhury

2 Mathematical Formulation

Let us start with a Schroedinger equation

$$H\psi(x) = E\psi(x) \tag{1}$$

In the above equation

$$H = \frac{p_x^2}{2m} + U(x) \tag{2}$$

In the above equation p_x stands for momentum in the x-direction. In quantum mechanics it stands for:

$$p_x = \frac{h}{2\pi i}\frac{d}{dx} \tag{3}$$

and U(x) is given by a delta function:

$$U(x) = a\delta(x) \tag{4}$$

We can convert this equation into the following second order linear inhomogeneous differential equation with constant coefficients:

$$\frac{d^2\psi}{dx^2} + \alpha^2\psi = \beta\delta(x)\psi(x) = \beta\delta(x)\psi(0) \tag{5}$$

In the above equation we have set:

$$\alpha^2 = \frac{(2mE)}{\hbar^2} \tag{6}$$

and

$$\beta = \frac{(2am)}{\hbar^2} \tag{7}$$

We choose $E > 0$, which leads to $\alpha^2 > 0$. Due to the fact that the delta function is zero except $x = 0$, $\psi(x)$ becomes $\psi(0)$. The general solution of $Eq.(5)$ is given by

$$\psi(x) = \psi_h(x) + \psi_p(x) \tag{8}$$

where $\psi_h(x)$ and $\psi_p(x)$ satisfy the following equations:

$$\frac{d^2\psi_h(x)}{dx^2} + \alpha^2\psi_h(x) = 0, \tag{9}$$

and

$$\frac{d^2\psi_p(x)}{dx^2} + \alpha^2\psi_p(x) = \beta\psi(0)\delta(x) \tag{10}$$

The solution of the homogeneous equation is for $x < 0$

$$\psi_{hL}(x) = Ae^{i\alpha x} + Be^{-i\alpha x} \tag{11}$$

For $x > 0$

$$\psi_{hR}(x) = Ce^{i\alpha x} + De^{-i\alpha x} \tag{12}$$

3   Particular Solution

We can rewrite the differential equation Eq.(5) as follows:

$$L\psi_p(x) = \beta\psi(0)\delta(x), \tag{13}$$

where we have defined

$$L = \frac{d^2}{dx^2} + \alpha^2 \tag{14}$$

We know that a delta functon can be expressed by an integral representation

$$\delta(x) = \frac{1}{2\pi} \int_{-\infty}^{\infty} e^{ikx} dk \tag{15}$$

We can easily show that the particular solution $psi_p(x)$ can now be expressed as follows:

$$\psi_p(x) = \beta\psi(0)(2\pi)^{-1} \int_{-\infty}^{\infty} L^{-1} e^{ikx} dk = \beta\psi(0)(2\pi)^{-1} \int_{-\infty}^{\infty} \frac{e^{ikx}}{(ik)^2 + \alpha^2} dk \tag{16}$$

The denominator within the integral has two roots for k, namely $k_1 = \alpha$, and $k_2 = -\alpha$. In a complex k-plane the zeroes of the denominator lie on the real axis. These are simple poles. The integration along the real line then yields for $x > 0$:

$$\psi_{pR} = \rho(\alpha) sin\alpha x. \tag{17}$$

For $x < 0$:

$$\psi_{pL} = -\rho(\alpha) sin\alpha x, \tag{18}$$

where

$$\rho(\alpha) = \frac{\beta\psi(0)}{2\alpha}. \tag{19}$$

For physical region $x < 0$ we get:

$$\psi_L = Ae^{i\alpha x} + Be^{-i\alpha x} - \rho(\alpha) sin\alpha x. \tag{20}$$

For $x > 0$ the total solution turns out to be:

$$\psi_R = Ce^{i\alpha x} + De^{-i\alpha x} + \rho(\alpha) sin\alpha x. \tag{21}$$

4   Matching

We now match the solution at $x = 0$

$$\psi_L = \psi_R \tag{22}$$

This yield the result:

$$A + B = C + D \tag{23}$$

We also match the derivative of the wave funtion at $x = 0$:

$$\frac{d\psi_L}{dx}\Big|_{x=0} = \frac{d\psi_R}{dx}\Big|_{x=0} \tag{24}$$

3

Using the above equation we get:

$$A - B = C - D - 2i\rho(\alpha). \tag{25}$$

We thus get:

$$C = A + i\rho, and D = B - i\rho. \tag{26}$$

Hence we get the final solution:

$$\psi_R = \psi_L = (A + i\rho(\alpha)/2)e^{i\alpha x} + (B - i\rho(\alpha)/2)e^{-i\alpha x}. \tag{27}$$

If we look for a solution of the type:

$$\psi_L = Ee^{i\alpha x} + Fe^{-i\alpha x} \tag{28}$$

and

$$\psi_R = Ge^{i\alpha x}, \tag{29}$$

we have to set:

$$B = i\rho(\alpha)/2. \tag{30}$$

We then get

$$\psi_R = \psi_L = (A + i\rho(\alpha)/2)e^{i\alpha x}. \tag{31}$$

This indicates that the whole matter wave tunnels through the δ-function obstacle.

5 Probability Density

We can also determine the probability density of the matter wave shown in Eq.(27). For $x < 0$

$$P_L(x) = \psi_L^*(x)\psi_L(x). \tag{32}$$

Remembering $\psi_0 = A + B$ and choosing arbitrarily A=B=1, we can show that

$$P_L(x) = 2(1 + 4\frac{\Delta}{E}) + 2(1 - \frac{\Delta}{E}cos(\frac{2}{a}\sqrt{(\Delta E)}x) - 4\sqrt{(\frac{\Delta}{E})}sin(\frac{2}{a}\sqrt{(\Delta E)}x. \tag{33}$$

6 Mathematica Program

Our first point of action at conducting an anylysis in Mathematica is to plot the probability density. We choose several values for Δ and a. Then we plot two dimensional graphs of the density as a function of x and E. The graphs are shown in the following diagrams.

7 Conclusion

We have sucessfully solved Schroedinger equation with a potential which is a delta function type. We got an inhomogeneous differential equation. The homogeneous part was easy to solve. In order to arrive at the particular solution we had to take the help of the residue theorem. We have then shown that the whole wave tunnels through the delta function wall. We have also plotted the probability density function as a function of coordinate x and positive energy E. For future instead of using a delta function, we intend to use a finite wall and look at the tunneling effect through it.

4

8　Acknowledgments

First and foremost we would like to thank Dr. Linda B. Hayden and the entire faculty and staff of the ONR program for all of the help, facilities, and encouragement provided for our research. We would especially like to thank Dr. A. L. Choudhury for all of the time, patience, and knowledge that he shared with us.

9　References

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3. E. Merzanbacher. Quantum Mechanics. Wiley and Sons.

5

```
P[x_, E_] := 2 (1 + 4 Δ / E) + 2 (1 - Δ / E) Cos[(2 Sqrt[E Δ] / a) x]
    - 4 Sqrt[Δ / E] Sin[(2 Sqrt[E Δ] / a) x];
```

```
Δ = 9; a = 1;
Plot3D[ 1000 P[x, E], {x, -8, 0}, {E, 1, 10}]
```
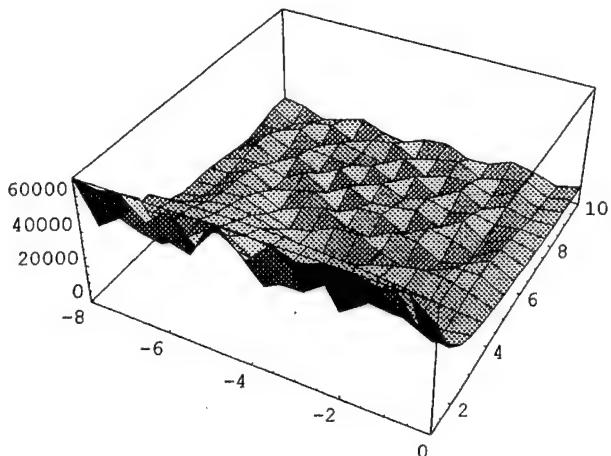


```
- SurfaceGraphics -
```

```
Δ = 20; a = 1;
Plot3D[ 1000 P[x, E], {x, -8, 0}, {E, 1, 10}]
```



```
- SurfaceGraphics -
```
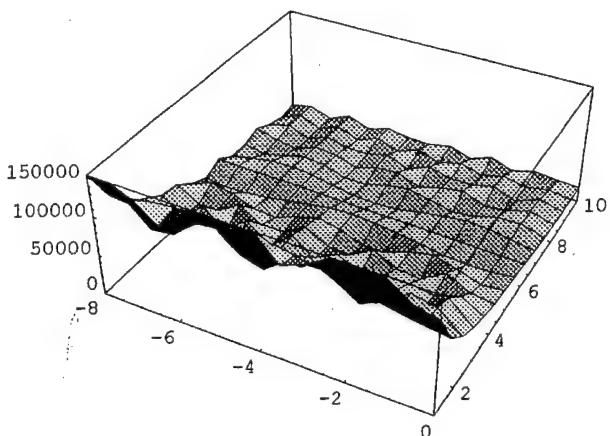
```
Δ = 40;  a = 5;
Plot3D[ 100 P[x, E], {x, -8, 0}, {E, 1, 10}]
```
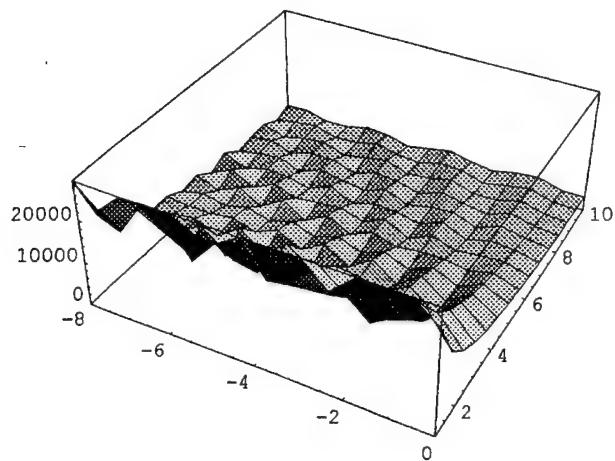

- SurfaceGraphics -

```
Δ = .01;  a = 1;
Plot3D[ 100 P[x, E], {x, -20, 0}, {E, .5, 1}]
```
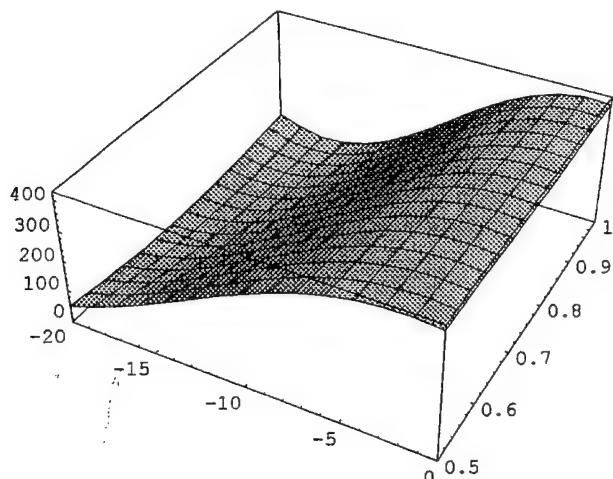

- SurfaceGraphics -

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Date and Place of Birth: January 1, 1933, Dacca, Bangladesh

Academic Qualifications:

Year	Certificates or Degrees	Institutions
1954	M.Sc. (Physics)	Dacca University, Dacca, Bangladesh
1960	Dr.rer.nat.(Theoretical Physics)	Freie Universitaet, Belin, W. German

Fellowships and Scholarships:

(a) DAAD (German Exchange) Scholarship   Nov. 1955 to July 1958
(b) Post-docatorate Research Fellowship   May 1960 to Sept. 1960
    at Fritz-Haber-Institut, Berlin
(c) Research Assistantship under Colombo   Oct. 1960 to Sept. 1961
    Plan Training Grant at the Dept. of
    Theoretical Physics, Imperial College London

Teaching Experiences:

(a) Assist. to the Prof. of Physics,   Feb. 1955 to Cot. 1955
    Dacca University
(b) Helping Assit. to the Prof. of Theor.   Nov. 1958 to Mar. 1960
    Physics, Freie Universitaet, Berlin
(c) Senior Lecturer in Physics, Dacca Univ.   Nov 1961 to Aug. 1966
(d) Assosiate Professor in Mathematics and   Sept. 1966 to Jun. 1968
    Physics, State College, Elizabeth City,
    North Carolina
(e) Senior Lecturer in Physics, Dacca Univ.   Aug. 1968 to Dec. 1968
(f) Reader in Physics, Dacca University   Jan. 1969 to Aug. 1969
(g) Associate Professor, State University,   Sept. 1969 to Jul. 1973
    Elizabeth City, N.C.
(h) Professor, State University, Elizabeth   Aug. 1973 –
    Citym N.C.

Publications

A variational calculatio of elastic scattering of electrons by helium.
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       National Bureau of Standards, U.S.A.) Proc. Phys. Soc. (London) 87,817 (1996).

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CAREER OBJECTIVE

To obtain a Doctorate and pursue at a competitive Corporation in
Information Technology,and related Physics field.

EDUCATION

- Elizabeth City State University, August 1999-present
- Majors: Computer science and Physics
- Concentration: Scientific
- GPA: 3.62
- Expected Graduation date: May 2003

EXPERIENCES

- Did research on the "Tunneling of Matter Wave Through a Delta Function Type of
  Barrier" at the ONR/NRTS lab at ECSU
- Did research on the topic"The motion of a harmonic oscillator under the
  influence of a derivative type of delta forces" under the Physics team at the
  ONR lab at ECSU.
- Working as a student tutor from November 1999-present
- Training assistant in the Office of the Math and Computer Science at Elizabeth
  City state University 11/1999- present
- A computer trainee in basics at the River Cty Community Center April 2000 -
  June 2000
- Worked with the MSEN Pre-college program as a mentor at Elizabeth City State
  University June 2000- July 2000

COMPUTER SKILLS

- C++
- Microsoft Word
- HTML
- Microsoft works
- Power point
- Page making
- Some UNIX (In the process of learning)

ACHIEVEMENTS

- Was able to prove my abilities and got a NASA/ONR scholarship at ECSU after one semester
- A chancellor's reserved fund's scholarship recipient

ACTIVITIES

- Undergraduate Physics Researcher at Elizabeth City State University
- Vice-President Society of Physics Students -ECSU chapter
- Math and Computer Science Club
- Concerned Black Awareness Club

HONORS

- National Dean's List
- All-American Scholar
- An Honor student
- Recepient the Chancellor's Emblem Award
- Made it on the Chancellor's list spring '00
- Made it on the Chancellor's list Fall '00

REFERENCES

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ACHIEVEMENTS

- Was able to prove my abilities and got a NASA/ONR scholarship at ECSU after one semester
- A chancellor's reserved fund's scholarship recipient

ACTIVITIES

- Undergraduate Physics Researcher at Elizabeth City State University
- Vice-President Society of Physics Students -ECSU chapter
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- Concerned Black Awareness Club

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- Made it on the Chancellor's list Fall '00

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*P*ersonal *S*tatement

I, Ramatoulie Bah a sophomore with a double major in Computer science and Physics at Elizabeth City State University is a researcher participating with the Physics Team in the Office of Naval Research Program at Elizabeth City State University, under the supervision of Dr. Choudhury and Dr. Hayden.
I also serve as a lab assistant in the same programe where I am further developing my computer skills, and at the same time gaining some valuable experiences.

With the help of our mentor, the physics research team, including my self, investigated the *"Motion of Harmonic Oscillator Under the Influence of a Derivative type of Delta Forces"*, last year(fall '00).
The main objective of the research was to find out and prove the different types of Delta Forces that act on a spring which is being pulled with a mass attached to It.

The research was very interesting and I find It very educational. As a physics major, I am getting first hand Information on how Newton's law of motion came about and works,and also how It affects masses in motion. This makes the learning process much easier.

This year my project involve the 'Tunneling of Matter Wave Through a Delta Function Type of Barrier'.

Being very interested in technology,I always try to Involve myself In activities pertaining to the advancements made in technology. Releazing my limited background and Inexperience, propels me to get Involve In as many research activities and Internships I can, while pursuing my Bachelor's degree.

After completing my Bachelor's degree In physics and computer science at Elizabeth City State University, I plan to enter graduate school,and eventually get my Doctorate's degree.

Katrina R. Banks
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Objective: To obtain employment in the field of Computer Networking; A position that will offer me the opportunity to expand my knowledge and skill level in this area.

Education
Elizabeth City State University
1704 Weeksville Road
Elizabeth City,NC 27909

Major: Computer Science
Concentration: Scientific
Expected Graduation: May 2003

Virginia Beach Technical and Career Education Center
Virginia Beach,Va 23465
Certificate of Completion in a Novell Network Training Course.06/99

Technical competencies
Knowlegde of network hardware, Microsoft Windows 95/98&NT,UNIX, Novell client software,C++ programming language and Novell netware 5.

Work Experience
Elizabeth City State University
1704 Weeksville Rd.
Elizabeth City,NC 27909
Duties: Lab Assistant, assist in training events,install software
make copies, filing, set-up hardware.

Food Lion Inc.
4740 Baxter Rd. Va Beach,Va 23462
Duties: Cashiering and customer service

South Carolina State University:Undergraduate Research Institute in Astrophysics
Orangeburg, South Carolina
Duties: Summer Intership, Completed research project

Extracurricular Activities:
Member of the System Administration team in the ONR/NASA research scholarship program, African-American Culture Club, Vocational & Industrial Club of America, SHARE program, NAACP Youth Group,Track and Field Team, Peer Tutoring program and Participated in the NAFEO Conference.

Honors/Awards
Award for outstanding achievement in Science 02/96, Student Stipend from the USENIX Association 11/99, Honor Roll, and Oustanding Office Assistance award '99.

Personal Statement

For the past semester I have been conducting research with the system
administration team in the Office of Naval Research Scholarship program at
Elizabeth City State University. This program specifically focuses on students who
wish to pursue a degree in Computer Science, Mathematics, Physics, and Technology.
I am also a Lab assistant at ECSU where I help to maintain the systems in the lab
and participate in various training events. Some the activities I have participated
in include the Women in Mathematics day, and the K-12 Learning Technologies
conference. During the Women in Mathematics training event I hosted an internet
scavenger hunt for 5th grade girls and I was a moderator at the K-12 Learning
Technology conference.

Being a member of the System Administration team, I have had the privilege to study
under two mentors, Dr. Hemant Pendharkar and Marie Koltuniak. While working with
them I have learned the various ins and outs of UNIX and system administration.
After being introduced to UNIX last semester, our current project is to install our
own network with a silicon graphics machine as our server.

I have a strong interest in networking, and system administration and I would like
to take the opportunity to learn more about them. I am particularly interested in
designing, maintaining and operating computer networks.

I have completed a Novell network training course and my goal is to pursue a
Masters degree in Networking or System Administration. I feel that if given the
opportunity to participate in this internship; it would provide me the knowledge,
hands on experience, and research experience I need to help me reach my goals.

RESUME

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Job Objective

Work in an environment that will allow exposure in the field of Physic or Computer Science.

Experience
August 2000 - Present-Blockbuster Video Store
Elizabeth City, NC 27909
Sales Associate

August 2000 - Present-Elizabeth City State University (252)335-3696
Elizabeth City, NC 27909
Lab Assistant

August 1999 - April 2000-Elizabeth City State University (252)335-3696
Elizabeth City, NC 27909
Lab Assistant

March 2000 - April 2000-Chanalos's Pizza (252)338-9800
Elizabeth City, NC 27909
Driver

June 9, 2000 - July 21, 2000-Hampton University and NASA Langley Research Center (LaRC) (757)728-6368
Center for Atmospheric Sciences (CAS)
Hampton, VA 23668
Student Reseacher for Advanced Undergraduate Research using Optical Radiation in the Atmosphere (AURORA) Internship Program (Laser Technology)

December 1996 - March 2000-Big Kmart (252)335-2400
Elizabeth City,NC 27909
Stocker, cashier, sales associate, and did layouts for the store

Education

June 12,1999-Graduate of Northeastern High School

Elizabeth City, NC 27909
GPA 2.9 on 4.0 scale

Current-Sophomore at Elizabeth City State University
Elizabeth City, NC 27909
GPA 3.4 on 4.0 scale

Achievements

Recipient of the USENIX grant. Recipient of the ONR Reseacrh Scholarship (2nd year). Recipient of the North Carolina Incentive Scholarship (2nd year). Recive PIE (Parteners In Education) Award four years of High School. Attended the LISA 99 Conference in Seattle, Washington. 4-H District Presentation Gold Medalist three years. Recipient of the AURORA Summer Internship.

Skills

Understandinge of: Windows 95/98, Microsoft Powerpoint, Photoshop, Microsoft word, Unix Software Installing Hardrives and CD-ROM's, C++ programming language, HTML language

Extracurricular Activities

ONR/NASA Research Program, Boys to Men Mentor, Eagle Contour, Volunteer work at Elizabeth City State University, Educational Talent Search, @ Elizabeth City State University, Attend NAFEO Conference in Washington D.C., President of the Kappa League sponor by Kappa Alpha Psi, Participated in NRTS Research Training at ECSU, Member of the USENIX Organization of Technology, Troupe S 4-H Club Member, The Physics Research Team 1999-2000

References
Available upon request
Personal Statement

BACK TO HOMEPAGE

PERSONAL STATEMENT

My decision to apply to the Oak Ridge Institute for Science and Education

Internship Program, was influenced by my decision to increase my participation as an African American in every level in the formulation and implementation of

polices and programs of American higher education. This is not the only thing that has

influenced my decision in applying for this internship or any others. Basically their are

three reasons I think I should apply: 1.) The benefits which I will receive; 2.) The chance

to develop a strong professional network; 3.) The experience that I would have gained

over my peers.

By participating in this internship I will be able to benefit in addition

to a great travel opportunity. I feel that this experience will give me support and

encouragement which will enable me to build my self-esteem, and also give me a desire to increase my

knowledge to understand the importance, and the value your internship will give me.

Also, I will have the chance to engage in meaningful dialogue, learning experiences, and

interactions with both professional and higher education officials. I will experience enhanced

campus-based learning experiences. I feel this internship will help me be able to

thrive, and the experience will far exceed my expectations. This opportunity will help me to continue

to grow and expand my knowledge and the hands on experience will give me the ability to

assist individuals in need and help them reach their highest potential.

Professional networking is an important benefit. Since my network is

limited and mostly local, this opportunity will help me to expand my network away from

home. By my participation I will be around high officials and professionals who could

train and mentor me through the internship. I am sure that I will come in contact

with many expressive, intelligent, and important people who will be a valuable asset

to my professional network.

The experience I will have over my peers will probably benefit me the most.

The first advantage I would have is being able to adapt to life faraway from

home. At this particular time my goal is to move closer in the academic area of physics.

I would like to have the opportunity to go into the classroom to share with those students

who will be going to work as future physicist or researchers. I would like to teach young

aspiring researchers to go into the field of science and know the basic philosophy of being good

researchers; to know the gratification and satisfaction that comes from research, and the

opportunity to change and make a difference in the lives of people they will serve. Also,

I will have already had the experience of working for an important company, program or rather

organization, and I will have learned teamwork, and the basics and ethics for working to

better the program as well as myself. This experience would be a great achievement and

experience I could include on my resume, which would look outstanding. I feel that this

opportunity will be a rewarding one; as I would like to continue and enhance my knowledge my

knowledge by participation in the program.

With this experience I have and with my participation as an intern I would

be able to teach and bring to others not only the philosophy and the theories, but the

real practical experiences that come only with working in this field or within my major.

I am very much aware that this opportunity will enable me to have the greatest amount of

respect and influence as far as my education is concerned. I realize the need to

further my education in order that I could become a self-suffcient individual, and some day a

supporting parent, as well as a role model for children. my mother told me , d"I want my children

to go to school and achieve all that they could to help them avoid the pitfalls of being in

poverty the rest of their lives. To make her happy and proud of me I will achieve and learn all

that I can to keep me from being in the pitfalls of poverty.

If I am given the opportunity to participant in you program, I will make

every effort to prove worthy of the opportunity. I will make sure that I bring to the

program the skills that will be beneficial to me , my team, and perhaps my mentors as far as my

knowledge and experience; though they are limited knowing my limited background. I feel

this internship will provide and invaluable work experience as well as an unforgettable

experience, and I feel that it would help me to mature professionally as well as personally.

Also, I can bring new insight, new knowledge, and new wisdom into my university as a student.

Ultimately, this opportunity will help me better myself as a role model, student, and a

guide for future student researchers. It would be a great honor to work with the Oak Ridge

Institute for Science and Education Internship Program, and a great summer experience for

me.

Vincent A. Davis, Jr.

E-mail Addresses

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vad39@hotmail.com

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Campus Box 214 Elizabeth City, NC 27909 (252) 331-8875	1406 Ekstine Drive Portsmouth, VA (757) 487-5707

Objective To obtain a position with opportunities to grow and develop in the field of Physics.

Education	I.C. Norcom High School Portsmouth, VA Graduated Cum Laude; June '99 Cumulative: 3.562		Elizabeth City State University Elizabeth City, NC Current Student Cumulative: 3.941 (As of Spring '01)
Work Experience	Lab Assistant ONR/NASA Lab Elizabeth City State University Elizabeth City, NC	Student Researcher Undergraduate Research Institute in Astrophysics (U.R.I.A.) South Carolina State University Orangeburg, SC	Training Event New First Baptist Taylorsville Portsmouth, VA
Scholastic Achievements	Mathematics, Science, and Technology Magnet Program Office of Naval Research/NASA Scholarship (Recipient)		National Honor Society ECSU Honors Program
Conferences	LISA '99 Conference Seattle Washington November 9-12, 1999		NAFEO Conference Washington D.C., MD February 15, 2000
Extracurricular Activities	Student Council Association (Homecoming Co-Advisor97-99) Access Mentoring Program(98-99)		Bethlehem Youth Ministry(President 97-99) United Black Christians Association
Volunteer Services	Tutor-Access Mentoring Program I.C. Norcom High School Portsmouth, VA	March Against Drugs Parade Suffolk, VA	Reading to Senior Citizens Beverly Manor Nursing Home Portsmouth, VA
References	Available upon request		

Personal Statement

Two summers ago, I was accepted to the Office of Naval Research/NASA program offered by Elizabeth City State University. This program is for students who wish to pursue a degree in Computer Science, Math, Technology, and Physics. Dr. Hayden has introduced to me a way to pursue a major in physics and to do related research. Currently, I am matched my current mentor, Dr. Choudhury, in the Department of Physical Sciences. With the aid of Dr. Choudhury and the other team members, we have completed a research project, the Harmonic Oscillator Under the Influence of A Sequence of Delta Type Forces. We had to set up an equation of motion of a mass according to Newton's second law of motion. We then had to develop a Mathematica program to plot the solution to this equation. I enjoyed working on this project because it has made me feel more comfortable with my major. This project alone has influenced me to do more research in the field of Physics.

Since being in the Office of Naval Research Program, I had the privilege to attend several conferences. I attended the 1999 LISA (Large Installation System Administration) Conference. This conference was held at the Washington Convention Center in Seattle, Washington. In Feburary of 2000, I attended the NAFEO Conference. There I had the honor of presenting a research project. We also went to several sessions and an exhibition. This past September, I went to the MUSPIN Conference held in Atlanta, Georgia. There I presented my summer research project and got a chance to view some of the other student projects.

I have also had the privilege to do an internship this past summer. I did my summer internship at South Carolina State University. It was called Undergraduate Research Institute in Astrophysics (U.R.I.A.), under the mentoring of Dr. Donald Walter and Dr. Daniel Smith. My research project for this summer was "Investigations of a Toy Model of Dark Matter Clustering." This study of dark matter clustering in the early universe was investigated by using a two-dimensional toy model created by Krauss and Starkman. This model was implemented through Mathematica software so that the variation of model parameters can be understood visually. We then used a correlation function so that we could calculate and compare model parameters that were determined from an actual galaxy catalog.

Besides this experience, I have experiences in several computer languages (C++, HTML, and Java), computer types (Window/Intel PC, Macintosh, UNIX), mechanical equipment. Also, I am a lab assistant in the Office of Naval Research Program, under the supervision of Dr. Hayden.

These experiences have convinced me to pursue the highest degree in Physics. I would like to continue my goal, if I am given a chance to become part of several research programs; in the fall and summer that will aid me in getting my bachelor's degree in Physics. By gaining a master's degree in Physics, I will attain the proper skills to perform the job of a physicist. Finally, after receiving a Ph.D., I would like to do research in the field of Physics and do projects that will assist people in their everyday life.

Nelson DeShawn Veale
PO Box 252
Lewiston, NC 27849
ShawnB17@hotmail.com
Nelson@umfort.cs.ecsu.edu
Home Number (252)348-2053
Campus Number (252)331-8506

Objective

: To find a internship that will prepare me for a professional job and graduate school

Experiences

:June 1999-July 1999
Graphics Assistant
-making plates
-making copies of white, pink, and yellow ordering sheet for Perdue Inc.
:September 2000-present
Computer Technician Assistant
-installing software on Macintosh Computers and Personal Computers
-replacing hard drives on Macintosh Computers
-replacing CD Roms on Macintosh Computers
-replacing 3 1/2 Floppy Disk Drives on Macintosh Computers
-upgrading memory on Macintosh Computers

Education

August 1996-June 2000
Bertie High School
Windsor, NC 27983
-Graduated in June 9, 2000
With Honors and North Carolina Scholars
Current-Freshman at Elizabeth City State University
Elizabeth City, NC 27909
Current GPA During Fall 2000 at ECSU: 3.412

Achievements

-1997-1999 Who's Who Among American High School Students
-Recipient of the ONR NASA Research Scholarship
-Recipient of the ECSU Incentive Scholarship

Extracurricular Activities

- Singing in the Youth Choir at Mount Olive Baptist Church
- SADD (Students Against Destructive Decisions)
- Prom Committee
- CERTL (Center of Excellence in Research, Technology, and Learning Program)
- UPWARD BOUND (Pre-College Program)

- SET-M (Science, Engineering, Technology, and Mathematics Program)

Skills

-Typing over 100 words a minute
-Microsoft Office 2000
- HTML
- C++ (in the process of completion by May 2001)
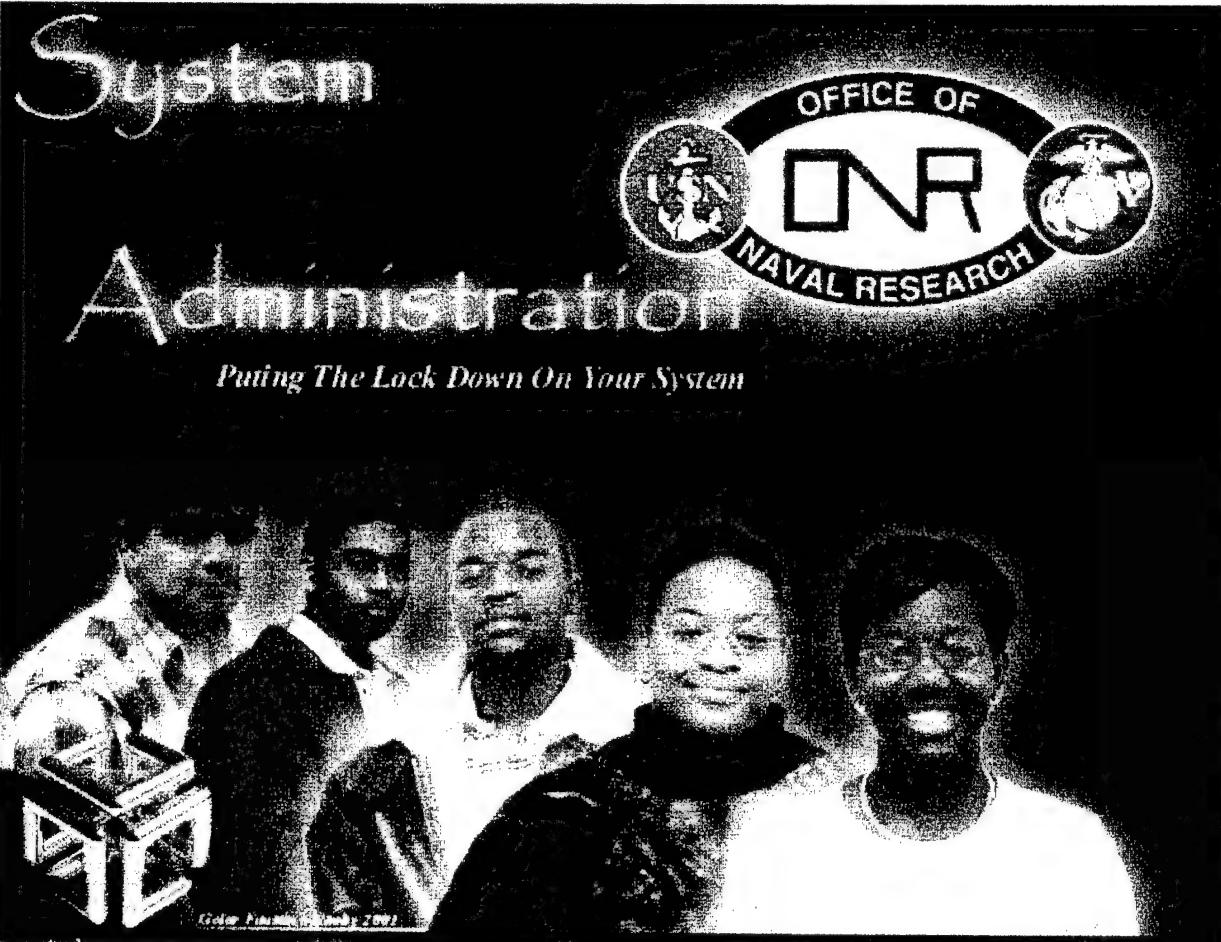
System Administration Research Team
2000-2001

Team Mentor:
Dr. Hemant Pendarkar

Team Members:
Golar Newby
William Gilchrist II
Paula Harrell
Patrice Turner

System Administration Team
2000-2001

Final Team Research Report

Members:
Patrice Truner
Paula Harrell
Willie Gilchrist
Golar Newby

Mentor:
Dr. Hemant Pendharkar

System Administration Abstract

In today's world of mass media technology and constant communication, a method of securing files is required. The 2000-2001 System Administration Team at NASA /ONR program at Elizabeth City State University has been doing an in dept study on the potential of programs to secure a system against outside attacks and virus spreading software.

At the start to the research of the System Administration team, the team has rebuilt an Indigo 2 system from spare parts in order to study the methods an administrator can use to secure the system initial from attacks. The team has also worked on knowing how the machines log on to accounts and keep unauthorized users from accessing secure information.

The concept of NIS and NFS has been explored during the duration of the research project. The hope was that the NIS and NFS administrative tools would greatly increase the efficiency of the labs resources. These administrative tools would also help in the understanding of a network spanning many different systems and many different types of hardware.

With the many different types of system software and system hardware a way of tying these systems together besides a server became a challenge. The chosen course of action was to use Linux as a router. The advantage of using Linux was all of the free software that the team could utilize once the main aspect of the project was completed. The main objective of the research was to achieve an understanding of the ins and outs of system administration on the UNIX platform across different types of environments.

Monitor
Screen Attributes
16" View Screen
16" Viewable Image
.26 mm dot pitch

Input Signal
Video Signal: Analog
H Frequency: 30-82 KHz
V Frequency: 50-150 Hz
Sync Signal: Green

Compatibility
Mack Adapter: Mac Sync
PC Adapter:

Input Connector
13W3

Maximum Resolution
Maximum: Up to 1152x870
Macintosh:
Flicker free:

Power Use
Power Supply:
Consumption: maximum

Video Bandwidth
100 Mhz

Plug and Play

Dimensions and Weight
Height: 14.9
Width: 15.9
Depth: 18.7
Weight: 60

Indigo II
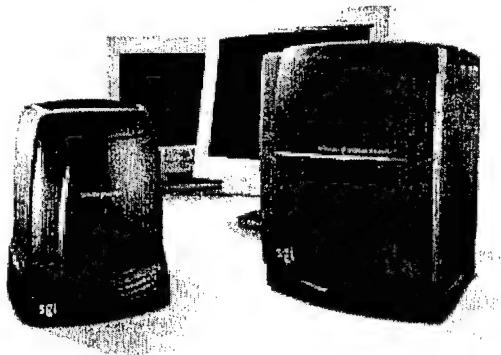
Silicon Graphics / Hardware

Hardware includes the physical components that are used to make up a computer, such as the monitor, mouse, keyboard, and the CPU (Central Processing Unit) only to name a few of them. The hardware is comprised of a hard drive, a tape drive, and a CD-ROM. The power supply is consumption at a maximum compasity for the Indigo 2. SGI (Silicon Graphics) is computer equipment that is used to provide people with a visual enhancement of high performance. The SGI is visual workstation uniquely that combines high-quality graphics and powerful processing. The Silicon Graphics IRIS Indigo 2 is a workstation that represents the original workstation that offers all of the advance 3D graphics capabilities.

Silicon Graphics Indigo 2 Hard Drive

The hard drive is hardware in the CPU where information can be stored according to the user command. The capacity of the hard drive is 2.00 GB (giga bytes). The speed of the hard drive is 6100 rpm (Rams Per Minute), and the seek time is set at 11.0 ms (Mili Seconds). This is a diagram of the actual hard drive, in the Silicon Graphics Indigo 2 there is also a 200 MHz (mega hertz) processor with 64 Mbytes (mega bytes) of memory.
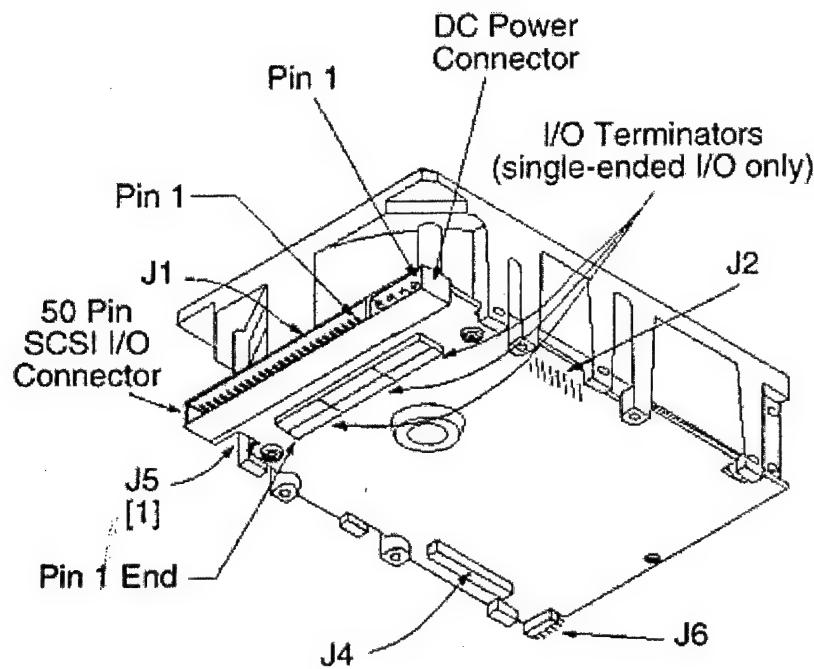
Silicon Graphics Indigo 2 CD-ROM / Tape Drive

The CD-ROM (Read Only Memory) came as an extension of the CD in 1984. In principle, the media and the drives are the same. The difference is in the data storage organization. In a CD-ROM, the data are stored in sectors, which can be read independently - like from a hard disk. T he CD-ROM are optic readable media, compared to hard disks, floppy disks and tapes, which are magnetic. The optic storage media are read with a very thin and very precisely aimed laser beam. The CD-ROM supplement the magnetic media. It has clear advantages in the areas of data density and stability. Data can be packed much more densely in optic media, and have much longer life span. It is presumed that magnetic media, such as a hard disk or DAT (*digital audio tape*) can maintain their data for a maximum of five years. A CD-ROM can hold 650/700 MB of data. Similar to the CD-ROM, a tape drive is simply use to store information. A tape driver does not store the information as compact as the CD-ROM. Both a tape drive and a CD-ROM drive is used for holding back up files.

Tape Drive
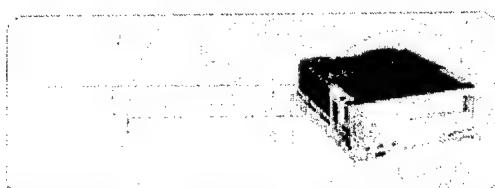
CD-ROM

Jumper Settings

The jumpers were set by a combination of on-line support, technical support, and local experts. Jumpers are pins that are to be configured according to your hard drive settings and the computer arrangement. HAD (head and disk assembly) is automatically sealed at the factory before the owner receive the computer. The air circulates with the HAD through a non-replaceable filter which is to maintain a free environment. The jumper settings are set to a certain computer requirements.
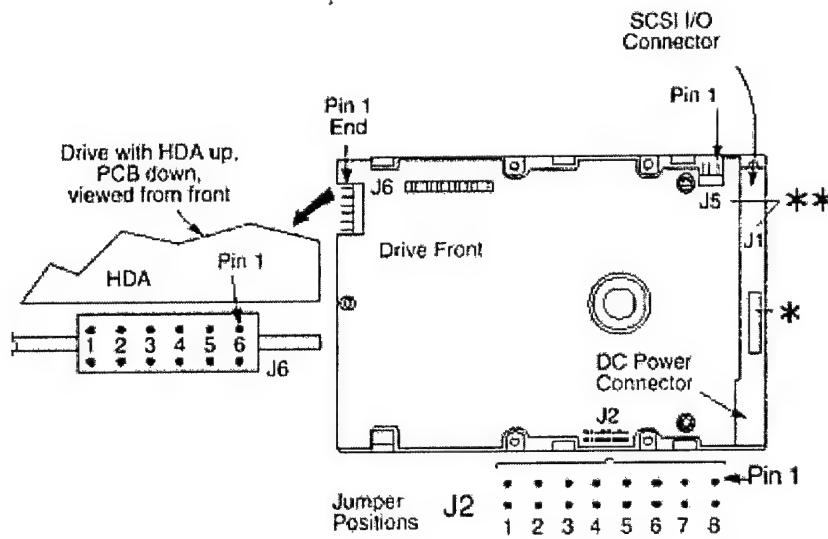
After the new drives are installed, they must be formatted before any installation can start. The research group checked the maintenance of the system by using the maintenance command line prompt under the maintenance window. The hardware is the first thing that the research group checked. The drives and the external CD Rom would be seen when the command *hinv* was typed if the jumper settings were accurate. To reformat the system and to boot the computer from the disk on SCSI control zero, device we typed the command *boot –f dksc(0,5,8)sashARCSdksc(0,5,7)stand/fx.ARCS –x*.

Once this command is read, the computer goes into default mode. A list of options appeared but the research team chooses number one. This option allows the research team to set up swap space for the computer. The research team set the swap space for the computer at 384, which double the memory of the system. The swap space, also known as RAM is the physical memory that the computer has.

The software is ready to be installed into the system after the new drives are set. The software disk is loaded using an external CD Rom drive. In order to have a successful installation, the research team had to load the CD's in a specific order. The specific order was:

      1.) Overlays 1

      2.) Overlays 2

      3.) Foundation 1

      4.) Foundation 2

      5.) Latest Applications CD

      6.) ON3 / NFS

      7.) Development Foundation

8.) Development Libraries

9.) Other Software that might be needed or desired.

The system asked for each CD twice. The first time was to test whether the hard drive could hold the operating system. The second time is when the actual installation of the CD accursed.

Actual System Administration can begin once IRIX 6.5.6 (the operation system) is loaded. The user is asked for a root password by the operating system. The root user is also known as the super user. With the password, the root user has full access to all files on the computer. Good System Administration ethnic is needed from this point on. The root user has the authority to close or lock any files.

The Graphical User Interface (GUI) is used to protect other open accounts once the password has been created. The GUI provides the root user with the tools to manage accounts on the network. System manager provides the main part of the GUI. The system manager are the disk manager, system shutdown, NFS (Network File System) manager, Network Setup, Login Setup, User Manager, Port Setup, Restart System, System Setup, Swap Manager, Print Manager, and the System Log.

The disk information for a particular machine can be showed using the disk manager. This allowed the research team to see the disk type, controller type, controller number, and the amount of disk space available. The Network File System manager allowed the research team to see the remote mounted file system that is on the machine. The system administrator set the preferences for the Network Information System (NIS) using the Network Setup. The login preferences are set with the Login Setup. The tool that allows you to create and modify user accounts on the network is the User Manager.

User Accounts

Creating a user account is a very simple task, but one that can only be done by a certain person, that being the System Administrator. The System Administrator must log into the system as root. After this is done, you click on the system manager and go to security and access control. Then go to user manager. You click on add to add a new user to the system. Once this is done, it will ask you to choose a login name. After that, type in your full name. It will then ask you to choose the type of user account. There are two choices. One is a local account and the other is a network access account. When you begin to create a user account, it automatically goes to a local account. This means that the user can only log into the computer that the account was created on. If a network access account is created, then the user has access to all the machines. It then asks you to add a password. It must consist of 6-8 characters. Even though the system administrator has access to everything, they do not have the power to figure out a users password. Once the password is entered, the system encrypts it into a code that is completely different from the password. It is virtually impossible to figure out. One of the characters must be a number. After this is done, a User ID is automatically given. This ID is generated by the computer. This is a numerical representation of yourself, acting a lot like a social security number so to speak. A number will never be repeated. In other words, no one can have the same number. When asked to choose a primary group, this simply determines how files are shared among users on a workstation. Every user is assigned to a primary group. In our lab, the primary group is students. The home directory is next. This contains the users configuration files and documents. It can either be local to your workstation or it can be located on a remote workstation on the network.

The home directory for the computer we are working on would be /usr/people/"login name." I put "login name" to just show that whatever you happen to choose for your login name will be at that particular spot. You then select the shell program you would like to use. We use "tcsh" because it happens to be an easy shell to use. The last thing to do is to confirm your shell settings. You click ok and the set up is finished.

Commands

When dealing with UNIX, commands play a tremendous part in the use of it. There are many commands but I will just touch on a few of the important commands. The *pwd* command tells what directory you are presently working on. The command *cd* stands for change directory. This basically means that you want to look into that particular directory. It will allow you to change your directory position. The command *ls –l* gives a list of what is in a particular directory. *Ls* stands for list and -l stands for long list. If you just type in *ls,* the computer gives you a shorter list of files but it is still the same files. The command *man* stands for manual and tells what all the commands mean. For example, if you put in the command *"man ls"* it will tell you what ls stands for. This can be used to find out what any command stands for. When you press Ctrl Z, it can suspend any job. When typing in *telnet "ip address"* or *"computer name"* it will allow you to log into another computer. Typing in "rlogin" also lets you log into another computer.

Once accounts have been created on the local system using the Graphical User Interface the challenge of exporting that group of files to all the systems on the network becomes the next task for the team to tackle. Using Network Information Service operation is the best means of exporting the password files to all of the other systems on the network. If the administrator did not use NIS then the he or she would have to enter passwords for each user on each machine. This method is not only inefficient, but also unpractical because a network could contain over one hundred systems and of one hundred users.

The first step in setting up NIS is getting the NIS domain name set. The file located at */var/ypdomain* allows for the administrator only to change or add the domain name. In the case of the system administrative team's network the domain name is *sysadm.ecsu.edu*. The next step is setting up the NIS server name. The file that the administrator edits is */etc/sys_id*. Here the team entered Kiaora as the server's name. With these basic principals setup, creating the passwd file for the NIS server was next. The extension of the passwd file that you create should end in .nis. The next step is setting up the binding to hold a folder named sysadm.ecsu.edu, which holds a file containing the NIS server name, Kiaora.

Building maps is the next carefully planned step in setting up NIS. The command ypinit –m creates a master. By typing chckconfig the administrator can then set ypservers to nis and hosts can also be set to nis. Restarting the computer is necessary for the changes to take affect. Typing the commands ypinit –c create a client, while typing ypinit –s produces a slave.

The system is now ready to export the passwd.nis file to any computer on the network, but what about NFS. Network File System (NFS) design and operation is also a critical part of system administration. NFS is a way of mounting files from one system to another. This is extremely important in the network that the team has created. The systems all use different types of hardware components and with NFS, an administrator has everything needed to maximize the server while giving the clients just what they need. With the NFS setup that the IXIR 6.5.6. GUI interface provides an administrator can take free space from one type of hard and let the server mount that space. This means that the hard drive is physically on the client's system, but the serve can use the free space as if it was actually part of the server's hardware. Even with different hard drives the systems are allowed to share resources collectively.

To cap off the research project the team used a Linux box to route the system to the Internet. With Linux the software comes with the installation process and is user friendly if you have good hardware. With the Linux box the task of system administration is boosted a few notches up. Now the system administrator must only know the components of SGI computers, but also must know the components of PC platform computers. Now the network is able to caterer to several different needs while still maintaining its cohesion as a network. Thus the job of a system administrator is done, or is it. With every changing technology and every changing treats a system administrator must be a renaissance man or woman of the world, not only knowing one platform or operating system, but several ever changing systems. The job of a system administrator is never done.

System Administration Team

2000-2001

System Administration Abstract

In today's world of mass media technology and constant communication, a method of securing files is required. The 2000-2001 System Administration Team at NASA /ONR program at Elizabeth City State University has been doing an in dept study on the potential of programs to secure a system against outside attacks and virus spreading software.

At the start to the research of the System Administration team, the team has rebuilt an Indigo 2 system from spare parts in order to study the methods an administrator can use to secure the system initial from attacks. The team has also worked on knowing how the machines log on to accounts and keep unauthorized users from accessing secure information.

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Team Members:

- Willie Gilcrest
- Paula Harrell
- Patrice Turner
- Golar Newby

Mentor:

- Dr. Hemant Pendharkar

System Administration Indigo 2 Hardware

Silicon Graphics' O2™
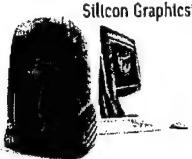
Willie Gilchrist II

SGI (Silicon Graphics)

- SGI is computer equipment that is used to provide people with a visual enhancement of high performance.
- The SGI is also workstation that offers all of the advance 3D graphics capabilities.
- What is hardware in a computer?

1

SGI Hard Drive Capabilities

- The capacity of the hard drive is 2.00 GB (gig bytes).
- The speed of the hard drive is 6100 rpm (Rams Per Minute).
- The seek time is 11.0 ms.
- 200 MHz (mega hertz) processor with 64 Mbytes (mega bytes) of memory

The Actual Hard Drive
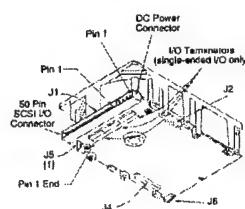
Jumper Settings

- Jumpers are pins that are to be configured according to your hard drive settings and the computer arrangement.
- The jumper settings are set to a certain computer requirements.

Jumper Settings Diagram
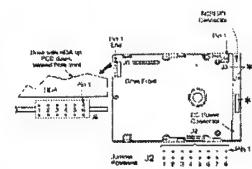
CD-ROM

- The CD-ROM (Read Only Memory) , data are stored in sectors, which can be read independently - like from a hard disk.
- CD-ROM are read with a very thin and very precisely aimed laser beam
- Data can be packed much more densely

Tape Drive

- A tape is a optic readable magnetic drive
- A tape driver does not store the information as compact, or last as long as the CD-ROM.
- Both a tape drive and a CD-ROM drive is used for holding back up files.

Installing The Operating System

By: Paula Harrell

---

1. Install new drives

2. Use the maintenance command line prompt

3. If the jumpers are correct, drives will be seen when *hinv* is type

4. The external CD Rom will be seen with this command also

---

5. *boot-f dksc(0,5,8)sashARCSdksc(0,5,7)stand/fx.ARCS –x* tells the computer to reformat and to boot from the disk on SCSI control zero, device number five.

6. The swap space was set to 384 which is double the memory of the system.

7. The swap space is the physical memory of the computer.

---

8. Swap space is also known as RAM (random access memory).

9. The next step is to install the software into the system.

---

10. CD's are loaded in this specific order:

   * Overlays 1
   * Overlays 2
   * Foundation 1
   * Foundation 2
   * Latest Applications CD
   * ON3 / NFS
   * Development Foundation
   * Development Libraries
   * Other Software that might be needed or desired

---

11. The CD's are asked for twice.

12. The first time is to test whether the hard drive can hold the operating system.

13. The second time is when the CD is actually being installed.

14. IRIX 6.5.6 is the operating system we installed.

The operating system will ask the root user to give a password.

The password is done using the Graphical User Interfere (GUI).

GUI contains the tools for the administrator to manage accounts on the network.

The tools are:

disk manager

system shutdown

NFS (Network File System) manager

Network Setup

Login Setup

User Manager

Port Setup

Restart System

System Setup

Swap Manager

Print Manager

System Log

Setting Up User Accounts

By: Patrice Turner

Getting Started

♦ System Administrator must log into system as root
♦ Go to Security and Access Control
♦ Click on User Manager
♦ Click on add

♦ Choose a login name.

♦ Type in your full name.

♦ Choose the type of user account.

♦ Choose a password.

4

User ID

♦ Generated by the computer.

♦ A numerical representation of yourself.

♦ Nobody will have the same number.

Primary Group

♦ Every user is assigned to a primary group.

♦ Determines how files are shared among users on a work station.

Home Directory

♦ Contains the users configuration files and documents.

♦ Can be either be a local or remote workstation.

Finishing Touches

♦ Select a shell program—(tcsh)

♦ Confirm shell settings.

♦ You are done!

UNIX COMMANDS

♦ *"pwd"*- present working directory
♦ "cd"- allows you to look into a directory
♦ *"ls"*- lists information about files and directories
♦ *"man"*- tells what commands mean
♦ *"Ctrl Z"* – suspends any job
♦ "telnet" or "rlogin"- allows you to log into another computer

NIS and NFS

By: Golar Newby

What is NIS?

NIS stands for Network Information Service. NIS is one of the best means of exporting files to various systems.

How does one go about setting up NIS?

What is NFS?

NFS stands for Network File System. This allows systems to share resources appropriately.

How does NFS work?

How does Linux play a part in System Administration?

Linux is used as a router to link the server to the Internet. The router also regulates the clients use of the Internet. Provided is a graphic of how the system is setup.

Future plans for the team.

- •Integration of more systems into the System Administration network.

- •Using Linux with PGP.

- •Loading different versions of Linux.

- •Leaning more efficient means of administrating the system.

- •More UNIX commands

Questions??
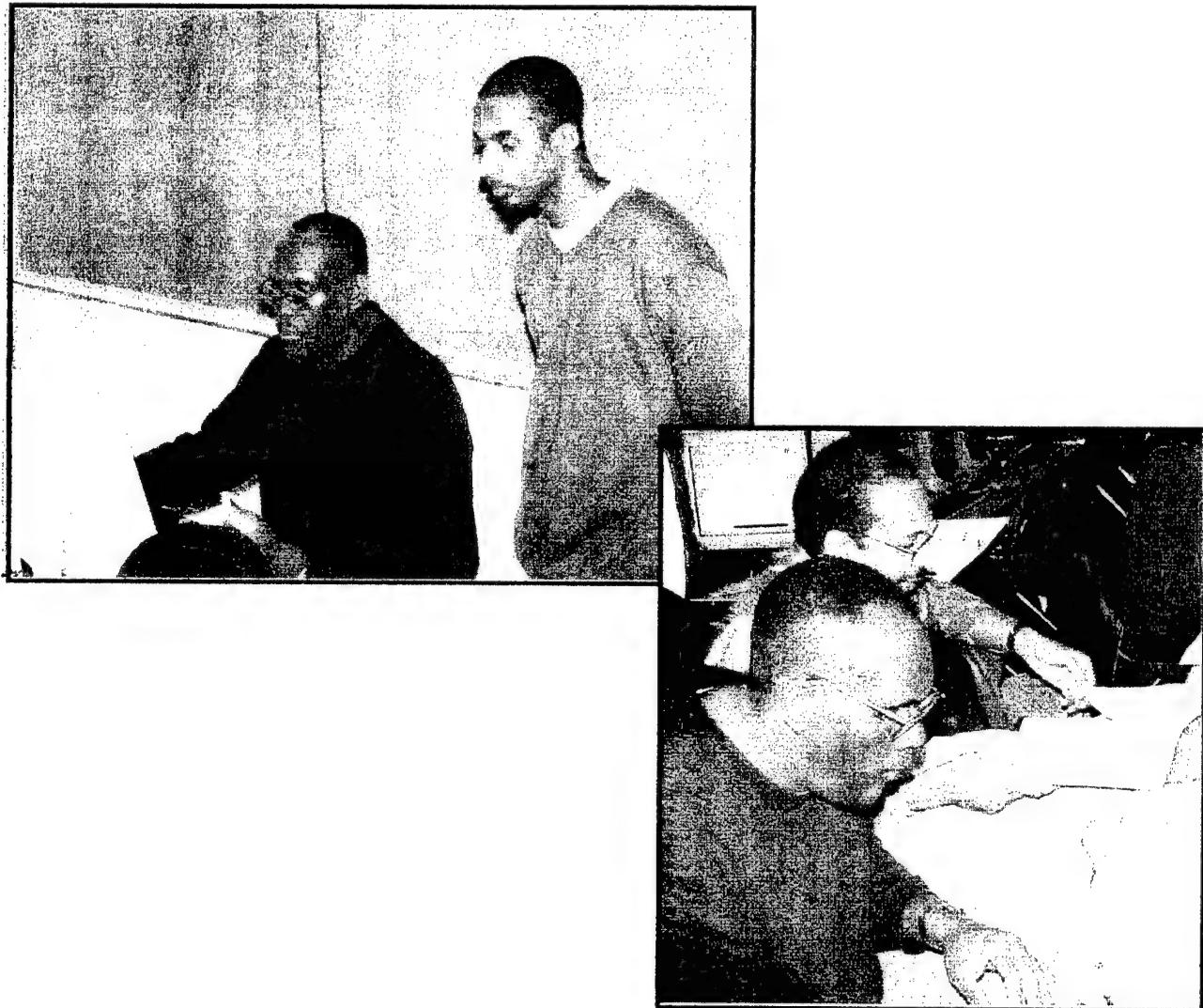
Networks Research Team 2000-2001

Team Mentor:
Dr. Linda Hayden
Mr. Robert Harris

Team Members:
Joseph Gale
Ernest Walker

Network Administration Team Report 2000-2001

Extend your **REACH**

Team Mentor: Robert Harris, Network Administrator

Office: RM 113B Lester Hall

Phone: (252) 335-3645

E-mail: rlharris@umfort.cs.ecsu.edu

Team Members:
-Joseph Gale
-Ernest Walker

URL's:
-Team Homepage

-Team Abstract
http://nia.ecsu.edu/onr/teams/networking/abstract.html

-Members Homepages
Robert Harris- **http://nia.ecsu.edu/teams00/network/resume.html**
Joseph Gale- **www.jag12.com**
Ernest Walker- **http://geocities.com/ewalkeriii/index.html**

2000-2001 NETWORKING RESEARCH TEAM ABSTRACT

The 2000-2001 Networking Research Team project focuses on file system sharing between Unix and other operating systems such as Windows and Mac OS. Another focus is on web-based email server applications that can offer more global and secure communications.

Through the use of network application software such as K-A Share by Xinet and DiskAccess by Shafer Solutions the investigation will demonstrate how the Unix Network File Sharing (NFS) and Network Information System (NIS) applications can be extended to the MacIntosh and Windows-based operating system desktops. The project will also link the importance of this capability to the daily usage in the ECSU computer science research lab environment that consists of multiple platforms.

The convenience of having a single password file for both the file server and mail server through the use of the Network Information System (NIS) application are offset by the security concerns of frequent global inter-network access for purposes of retrieving user email. Therefore, another research goal is to achieve global server-based password authentication with encryption. Plans include the installation, testing and evaluation of a web-based email application to address this relevant security issue.

This semester the Network Administration Team's focus was to do more than just research projects. Since much of the everyday task of a lab rely on networking, this year the team focused on projects that will be useful to everyone in the lab regularly from now on.

Unix-to-Mac connectivity:
Because the lab has such a variety of machines with different platforms and file systems, connectivity is not easy. In the past FTP clients have been used to ftp files from one platform to another but FTP is very inefficient. To relieve this problem on the Mac's we have installed a combination of K-AShare for the Unix platform and AppleShare for the Mac's to allow file sharing between the two and streamline connectivity.

K-AShare is a file sharing technology that transforms a UNIX host and its Network File Sharing (NFS) into a powerful AppleShare server for Macintosh users. With K-AShare, Macintosh workgroups will achieve faster file transfer speeds, more efficient volume control, and enhanced network communications, with no change to their familiar Macintosh environment.

K-AShare features:
- Multi-platform compatibility allows Macintosh and UNIX systems to share data and resources. K-AShare supports SGI hardware running IRIX 5.x or newer. All available Mac OS versions are fully supported.
- Performance soars because the UNIX host brings robust multi-processing, increased disk space, and improved system security. With support for AppleShare over TCP/IP since 1997, K-AShare achieves network file transfer rates as fast as your local disk.
- Beefed up security with Access Control Lists (ACL) K-AShare brings tight UNIX security to AppleShare networks, and adds access control lists for secure file sharing over intranets, extranets and the Web, bringing a higher level of security to the convenience of transferring files via the Internet.
- NFS Gateway: Through K-AShare, Mac users can access mounted NFS file systems anywhere on the network. A server running K-AShare can be a client to remote file servers based on NFS, making any mounted file system accessible to Macintosh users.

Now for the second part of the equation, AppleShare. AppleShare is the software that runs on the Mac's OS that is used to share files. AppleShare has a secure GUI interface that the user uses to log on to the remote NFS file system and access files on a remote server. AppleShare performs better secured, faster, and easier to use than a FTP client. To use AppleShare, the user would simply:
- Go to "chooser" on any Mac
- Select AppleShare from the list of icons
- Choose the server you are trying to access
- Log-in using your account on that server

Once you are logged on your count will pop up in a window and you now have drag and drop access.

Unix-to-PC connectivity:

As apparent from the multitude of downloaded FTP applications on the PC's, there is a demand for a means of transferring files efficiently between your user account on the Apollo file server and the Gateway PC's. This has caused a build-up of FTP applications on some machines. On some of the machines there are even expired trial versions of some of these applications.

To eliminate this problem we turned to DiskAccess software from AccessNFS that allows drag and drop transfer of files between Unix and PC interfaces. We applied for a trial version of the DiskAccess software that was emailed to us, to test on a PC. DiskAccess uses NFS, or the Network File System, to communicate with Apollo and share files. Once DiskAccess connects to the server, all of the permissions and parameters of the Unix network are enforced.

To use DiskAccess is a simple process. Once it is installed, use Windows Explorer, Network Neighborhood, or File Manager to browse and connect to file systems located on Apollo. In Network Neighborhood, click NFS Network then DefaultLAN and choose the server you are trying to reach. Apollo can be reached by selecting its IP address (195.85.48.111) from the list. Then the user is free to navigate to their user account in the Student folder. You can even place shortcuts to frequently accessed NFS folders or files on the desktop.

EMU Webmail:

When our mentor, Mr. Robert Harris suggested that the networking team establish our own email server, we discussed what kind of service we would provide. We had several questions. Would we implement a web-based server or in-house post office? Would the email be stored on our server or on their present locations? How could we have a system with the speed required by the users? Which operating system would be most efficient for such a system? Would the system reside on Atlantis or Apollo?

Choosing an Operating System

First, an operating system had to be chosen. Ernest suggested that Windows NT was the system for the job. He has comfortable familiarity with the environment of Windows 95/98/NT. It was fairly reliable and he had more knowledge of it than any other operating system. Mr. Harris suggested Unix or Linux because of their reliability. Unix and Linux do not have the overhead that the Windows operating system has—as memory allocation for non-required programs. Another thing that convinced Ernest that a Unix or Linux program would worth our interest was that a recent graduate spoke of its use in corporate America. It would be good to utilize one of them in an actual application.

Now the choice came between Unix and Linux. If we were to use a web-based email server it would have to be run on Atlantis, which is on a Linux server. Linux is a complete operating system that is similar but not identical to UNIX. It runs on a variety of hardware, ranging from 486's/Pentiums/Pentium II's to hardware such PowerPCs, and Silicon Graphics workstations. Probably the most unique characteristic of Linux is that it is freely distributable. Freely distributable means that the source code for the kernel and most software cannot be withheld. This does not mean that companies cannot charge for it.

Choosing a Server

An overriding factor in choosing the operating system is the server that we will be using. The operating system that is selected depends on the one the server is utilizing. The servers which ONR presently use are:

- Umford   - *umfort.cs.ecsu.edu*
- Nina - *nia.cs.ecsu.edu*, and
- Atlantis - *atlantis.cs.ecsu.edu*.

Umfort and Nia are Unix-based and are primarily production servers used for the Office of Naval Research site and email. Atlantis is the server that handles the Internet web courses for our secondary school partners. Given all the traffic on Umfort and Nia, Atlantis would be the optimum server.

Why Linux?

In the past, the term Linux referred only to the kernel (the core of the operating system), but today the phrase itself refers to a collection of configured software that runs on top of the Linux kernel. These *collections of software* are known as distributions. Although these distributions often have their own unique attributes, they are essentially the same.

The easiest way to obtain a Linux distribution is to purchase a CD-ROM containing the software unless you have a fast Internet connection. Two American companies stand out in offering these distributions at incredibly cheap prices—Cheapbytes and LSL. They do not offer technical support. Red Hat 5.0 offers 30 days free technical support in installing their distribution. Apollo uses the Red Hat Linux Mandrake 7.0, which has an up-to-date distribution with some excellent utilities for configuring Linux; it has the best package manager (for easy installation and de-installation of software), and has wide support among the Linux community.

The Linux Operating System

Linux is a free, stable, fast and easy to use operating system. Even if we aren't aware of it, we have probably used Linux indirectly. According to a web server survey performed by Netcraft, most www servers are running on Linux. While Linux is a very powerful server

operating system, it is not exclusively a server operating system. Linux is a very good Workstation/Home use operating system, as well.

After research the Linux operating, we learned several things about the operating system:

- Linux is a variation of Unix.
- A Linux Distribution has thousands of dollars worth of software for no cost (or a couple of dollars if purchased on CD)
- Linux is a complete operating system that is:
  - Stable - the crash of an application is much less likely to bring down the operating system under Linux
  - Reliable - Linux servers are often up for hundreds of days compared with the regular reboots required with a Windows system
  - Extremely powerful
- Comes with a complete development environment, including C, C++, and Fortran compilers, scripting languages such as Perl, Awk and sed.
- Networking facilities: allowing you to share CPUs, share modems etc; not included or available with Windows 95.
- The ideal environment to run servers such as a web server (e.g. Apache), or an FTP server.
- A variety of commercial software is available if your needs aren't satisfied by the free software.
- An operating system that is easily upgradeable
- Supports multiple processors as standard.
- True multi-tasking.
- An excellent window system called X; which is a more flexible equivalent of Windows.

Choosing a Web-based Email

Web-based email is one of the great communications tools of the Internet. It basically is a way for you to send and receive email messages right on a Web page. This means not only that you no longer need an email application separate from your Web browser, but also that you can check your email from anywhere there's an Internet connection.

When you have a Web-based email account, your email box lives on an Internet server and can then be accessed from anywhere you can establish an Internet connection. Similarly, only an Internet connection is required to send or receive email.

Along with the convenience of being able to check your mail from anywhere, there's the attractiveness of free email, recent upgrades let you receive actual Web pages as email. HTML email is not a different service than Web-based email; it's simply an improvement in the quality of data that can be sent.

After choosing the server and operating system, we searched *www.linux-mandrake.com* and *linux.org* for the best Linux email distribution. Following an exhausted search, Mr. Harris suggested we go ahead with EMU Webmail.

EMU Webmail has several features including:
- Enhanced interface
- POP3/IMAP4 mailboxes
- Multiple mailbox support
- Extensible address books
- Multiple SMTP hosts
- Support for embedded rfc822 attachments
- Use of custom MS Word conversion utility
- User-definable folders
- Optional outbox for sent messages
- Sortable message index
- Real-time Spam
- Printer-friendly e-mail
- Conversion of MS Word documents to text format
- Signature file on outbound messages
- Spell check
- Postponed messages
- Reply, quoted reply and Reply all
- Forward message
- FastCGI/mod_perl compatible,

- NT/Unix versions
- Runs on any CGI-compatible

Requirements of EMU Webmail

Before downloading EMU Webmail 4 it was suggested that our system meet the following basic system guidelines:
- Perl 5.005_03. (Test version with perl -v)
- 64 MB of RAM.
- 100 MB of available disk space, 2 MB per user for storage.
- Existing POP3 or IMAP mail server populated with e-mail accounts.
- Existing SMTP server.
- WWW server capable of CGI.
- Internet connectivity.

An Ideal Installation of EMU Webmail

The documentation stated that the ideal EMU Webmail could be installed using six simple steps. These were guidelines were only recommendations and are not requirements although following or exceeding these guidelines could make installation and use of the product relatively easy.

1. *Download and unpack the EMU Webmail 4 Distribution using*

```
% gunzip distfile.t9z
```

2. *Setup Environment with Supporting Perl Files*

For EMU Webmail 4 to run properly, the system must have several supporting files freely available on the Internet. If the computer has all the necessary files, no files will be added to it. If files are missing or obsolete, the emuinstall program should fetch and attempt to install the latest files for you. All of the following installation steps must are to be executed as the administrator user (root). In the top directory of the distribution, execute the emuinstall program by typing:

```
# perl   emuinstall
```

As the installed program runs, we were to pay careful attention for any error messages. Most error messages are harmless warnings, however if something goes wrong at a later step in the installation process, an improperly configured Perl module primarily caused it. After the emuinstall program finished we were returned to the command prompt, ready for the next step.

3. *Create and populate the directory structure.*

The EMU Webmail 4 distribution contains two main directories: */html* and */data.* The */html* directory contains all the files that are accessible from the web server, including the main CGI file and all the images and help files. The /data directory is composed of user directories, configuration files, and HTML template data that should not be accessible from the web server. Both the */html* and /data directories were to be readable and writeable by the user your web server is running as (often the user nobody).

The contents of the distribution's /html directory need to be copied to be in your web server's hierarchy. Create a directory inside this directory:

```
#  mkdir /usr/local/apache/htdocs/emu
```

Next, we copied the distribution's /html directory to the web server's directory that you just created:

```
# cp /html* /usr/local/apache/htdocs/emu
```

Now perform a similar set of steps for the /data directory. First, we decide where to put the data directory. Make the directory by typing something similar to the following:

```
#   rnkdir /emudata
```

Then copy the contents of the distribution /data directory to the newly created directory:

```
#   ap /data* /emudata
```

The final step to populating these directories is to setup the security permissions. The */html* directory should have the same file permissions as your other files in your web server. After verifying this, set the file permissions on the /data directory to restrict access to only the web server user:

```
# chown -R nobody data    to change file ownership
#   chmod -R 750 data    to change the permissions mode
```

4. *Setup the* init.emu *file*

A file called `init.emu` unites the `/data` and `/html` portions of EMU Webmail 4 by telling the CGI program where to find the data directory:

```
#   page_root=/emudata
```

5. Testing the CGI file.

Now that perl has been setup, the files have been copied to the correct locations, and the ini.emu file has united all parts of the program, it is time to test the program.

The following command should be issued in the /*html*/ directory:

```
#   ./nph-emurnail.cgi test""
```

If everything is setup correctly, HTML should have scrolled by and fill up the screen.

6. View EMU Webmail 4 from a web browser

The final step in the initial installation process is to view the program in action from a web browser.

Delete the `/tmp/emuerror` file if it exists:

```
rm /tmp/emuerror
```

After this is done we would ready to point a web browser to the location you placed the `/html` directory. If everything is running correctly you should be ready to run the program and start using web mail by EMU Webmail.

The Actual Installation

Difficulties in installing EMUmail Webmail

RPM

After the initial EMUmail download was complete, we got an error message stating that the version our rpm was incorrect. The RPM is the Red Hat Package Manager. It is used to install, upgrade, or remove a package. We also chose to search www.rpm.org and http://www.linux-mandrake.com as well as emumail.com for RPMs. The EMUmail website gave us two alternatives, we chose Module Pack for RedHat Linux 7.x i386.

FastCGI

When EMUmail was running it seemed sluggish. It took quite a long time for the page to come up. EMUmail can enable `Fastcgi` in order to handle this problem. CGI for the uninitiated is an acronym that stands for the "Common Gateway Interface". CGI is the method that web servers use to communicate with programs that web developers write to respond to user input from the web. If you have ever filled out a form on the Internet to comment on a article or purchase something online chances are that, your input was processed by a CGI script in the background. `FastCGI` is a language independent, scalable, open extension to CGI that provides high performance without the limitations of server specific APIs. It provides higher performance by reusing processes to handle multiple requests.

The EMUmail documentation gave instructions that we used to install `fastcgi`:

1)Change the filename "`emumail.cgi`" to "`emumail.fcgi`".

2) In the file "`site.emu`", make these changes:
   a) Change "`emumail.cgi`" to "`emumail.fcgi`" in the line containing "emu_url=".
   b) Set "use_fastcgi = true" in the appropriate line.

3) Check that you have `mod_fastcgi.so` in your `home/emumail/modules` directory.
4) Add these lines to your `httpd.conf`:
   a) In the list of LoadModule directives:
   `LoadModule fastcgi_modulehome/emumail/modules/mod_fastcgi.so`

`FastCGI` would theoretically increase the speed of our web page, and should have taken care of the problem. `FastCGI` had to be moved to a different directory in order to finish the necessary changes, however after it was moved, the Atlantis server went down. With the operating system not functioning we were unable to access the hard drive. Unlike Windows NT or Apple, we could not reinstall the operating system without loosing software other than system data. There were three things we could have done: reinstall Mandrake Red Hat 7.0 on Atlantis, install EMUmail on another system, or our place the hard drive on another system.

During the final meeting, our mentor, Robert Harris remembered that our hard drive, the Quantum 4550s, has a SCSI interface. Once it is removed, our hard drive could be connected with an IRIX system unit and the hard drive would be read. At this point, the `FastCGI` could be place at its original location. The only obstacle that stands in our way at this point is finding SCSI cable. Once this problem is resolved, EMUmail is expected to be completed within the week.

Conclusion

The research has taught us the importance of flexibility, the power of Linux, and the availability of open source software. As a part of a research team, one should be flexible enough to adjust to a change and evolution. For the team this meant using a different

operating system, Linux. Linux is open source software with which the possibilities are virtually limitless. Linux is also very powerful. It is stable, reliable, and can maintain a robust server on a dated 386 computer. We were also astonished by the vast availability of open source software. There are variably tens of thousands of software titles available at little or no cost.

Web resources:
- Xinet- www.xinet.com
- Apple- www.apple.com
- AccessNFS- www.ssc-corp.com
- EMUmail- www.emumail.com
- Redhat- www.redhat.org/
- Linux Online- www.linux.org/
- First Linux- www.firstlinux.com/
- Linux.com- www.linux.com/
- EMUmail- www.emumail.com/
- Foldoc- http://foldoc.doc.ic.ac.uk/foldoc/index.html

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PORTSMOUTH, VA 23701-3830
TELEPHONE (757) 487-5565
Email: robert@umfort.cs.ecsu.edu

ROBERT HARRIS, JR.

Objective

To become a member of a network team where my technical skills and experience can be used to full advantage; an opportunity with challenge and growth potential.

Summary of Experience

Over one and a half decades of experience primarily as a <u>contract employee</u> in computing and network communications spanning legacy IBM mainframes running SNA to desktop workstations running TCP/IP and analog POTS circuits to digital ISDN and T1 circuits.

Work Experience Highlights

1998 – Present Elizabeth City State University/Adnet Systems Elizabeth City, NC
NETWORK ENGINEER

- Responsibilities include performing network and system administration in support of the NASA Network Resources and Training Site located in the Department of Math and Computer Science. Tasks include maintaining the network of Unix, MacIntosh and PC platforms. Serving as system administrator for the file, mail, web and threaded discussion servers. Evaluating and specifying Cisco Catalyst 2924 Enterprise switches to upgrade the network from 10mbps shared hubs to 100mbps managed switches. Evaluated, configured and implemented a Sun Screen EFS firewall to help secure the network. Recommended and implemented an Intel Team Station video conference system. Evaluated and implemented a 3Com Superstack 1500 remote access server for dial-up access onto the network.

1996 – 1998   InfiNet/Network Two   Norfolk, VA
NETWORK OPERATIONS ENGINEER

- Performed turn-up, testing, troubleshooting and monitoring for over 100 points of presence for a national internet service provider. Hardware included Cisco routers, Lucent Technologies Portmaster and US Robotics Total Control remote access servers, Sun Sparc servers, Larse and Adtran CSU/DSUs, Telco circuits included POTs, loop start, wink-start and aggregate T1 and ISDN BRI and PRI. <u>Filled-in for the Director of Telecommunications Engineering during an extended leave of absence</u>.

1993 – 1995   U.S. Postal Service/Electrocom Automation   Martinsburg, WV
SYSTEMS SPECIALIST

- Responsible for maintaining, upgrading and troubleshooting the remote bar-code image processing system and associated LAN/WAN network. System was primarily comprised of a DEC VAX server, Intel Multibus application specific CPUs, SCSI storage drives, Racal brouter, Intel workstations, Thick ethernet and point-to-point T1 circuits. Test equipment included Sniffer.

1990 - 1992   Department of Veterans Affairs/Opsys, Inc.   Martinsburg, WV

NETWORK ANALYST

- Performed oversight functions for start-up of the nationwide 15,000 port Sprint based X.25 network for the Department of Veterans Affairs. These functions primarily consisted of writing and canning Oracle SQL reports for VA management. This provided for tracking, verification and reporting on the contractors deliverables in the areas of network implementation and build-out, trouble ticket tracking, traffic statistics and service credit calculations due to various types of network service interruptions.

1989 – 1990   Department of Energy/CDSI, Inc.   Germantown, MD

SENIOR TELECOMMUNICATIONS ANALYST

- Specified and facilitated appropriate transmission mediums for end-user applications on the DOEs nationwide telecommunications system. Mediums included dedicated and switched telco links and satellite backbone with terrestrial-based switching nodes.

1988   City of New York/Boeing Computer Services   New York, NY

SENIOR NETWORK TECHNICIAN

- Planning for rehoming of 5,000 IBM 3270 LUs from a multi-linked SNA environment to a more cost-effective single link SNA backbone. Duties included designing the Network Operations Center and writing test procedures.

1987 – 1988   Computer Sciences Corporation/ATR   Herndon, VA

NETWORK TECHNICIAN

- Performed quality assurance for the vast number of cutovers to the X.25 based Consolidated Data Network (CDN) for the US Treasury Dept.. This included making sure that the various X.25 PADs, telco circuits, network hardware and software parameters were in place prior to the cutover window.

1985 – 1986   Hershey Chocolate Company   Hershey, PA

TELECOMMUNICATIONS ANALYST

- Accomplished tasks included a 50% reduction in remote site switched access costs which entailed analyzing data link layer traffic followed by changing software parameters and hardware to operate in half-duplex mode. Reengineered and re-built a voice keyset system to integrate both voice-mail and data traffic. Responsible for troubleshooting chronic IBM SNA problems.

1981 – 1984   Northeast Regional Data Center/Univ. of Florida   Gainesville, FL

TELEPROCESSING TECHNICIAN

- Handled various end-user and network related problems in the IBM mainframe SNA environment. Utilized, now Netview Products, NCCF and NPDA to control and manage the various domains, cross domains, PU and LU sessions. Installed 327X controllers, 3270 terminals, ASCII-dumb terminals and modems.

Education   1981 – 1983, Electrical Engineering, University of Florida, Gainesville, Florida
1977 – 1978, Electrical Engineering, N.C. A & T State Univ., Greensboro, NC

References   Gladly furnished upon request.

ERNEST WALKER, III
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Elizabeth City, NC 27909
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ewalk3@dwp.net

EDUCATION

08-1997-
Present

Elizabeth City State University,
Elizabeth City, NC.
GPA: 3.64.
B.S., Computer and Information Sciences major,
Airway Science, minor.

Expected Graduation Date: Fall 2001.

College of the Albemarle,
Elizabeth City, NC.
A.A.S., Information Technologies.
Graduated, Spring 1998.

RESEARCH

STUDENT RESEARCHER
07-1999
Present

Office of Naval Research,
Elizabeth City State University,
Elizabeth City, NC.
Member of the System Administration and Networking Teams. Conducted research on Unix function and operation, installed SGI systems, and merged SGI onto a network server.

INTERNSHIP
Summer 2000

JGOFS/ECSU,
Elizabeth City, NC.
Compiled and posted data sets on the Internet with the Joint Global Ocean Flux Study using HTML, JavaScript, and graphics.

COMPUTING

Programming Languages:	C/C++, J++, JavaScript, Pascal, Fortran, HTML, COBOL, and SQL.
Applications:	WordPerfect, Microsoft Office, Aldus Page Maker and Photoshop, Mathematica, and Lotus 1-2-3.
Operating Systems:	Unix, Windows 98/ 95/ 3.x, Linux and Macintosh.

EXPERIENCE

TAX PREPARER
01/1995-
Present

Jackson Hewitt Tax Service,
Elizabeth City, NC.
Prepare tax forms on IBM compatibles on a seasonal basis, assist customers, support the telephone support line and upgrade IBM compatibles with JH software.

NIGHT AUDIT
MANAGER
06/1987-
12/1994

Omni Europa Hotel,
Chapel Hill, NC.
Performed nightly accounting backups, balanced daily receipts, front desk customer service, assisted security, prepared daily accommodations and revenue reports, scheduled auditors, and interacted with area hotels.

SUPPORT
TECHNICIAN
06/1986-
05-1987

Kelly Services/Northern Telecom, Inc.,
Research Triangle Park, NC.
Repaired, configured, and upgraded Hewlett-Packard 2627As. Interfaced extensively with screeners and assisted with hardware problems. Prepared productivity reports and monitored daily production. Set up password security log. Trained workers on the operation of HPs.

REFERENCES

Furnished Upon Request.

JOSEPH ANDREW GALE

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School: ECSU Campus Box 693 Elizabeth City, North Carolina 27909 (252) 331-8879 fax: (240) 414-5535
Home Page: http://www.jag12.com

OBJECTIVE

Upon receiving my Bachelors Degree in Computer Science, (with a minor in Airway Science) I plan to continue my education by immediately attaining my Masters Degree, Followed by a PhD. I plan to put these Degrees to work in a successful career with a large corporation or organization in the computer technology field, such as NASA or NOAA, with whom I have interned, or a private company. Once I have established my career I will put these qualities to work profiting my own businesses.

MEMBERSHIPS

NASA- ONR (Office of Naval Research) Researchers Program
- Networking Team
- System Administration Team
- HTML/JAVA Team

Top Teens of America, San Antonio Metropolitan Area Chapter
- Chairman of Beautification
- Administrative Assistant
- Top Teen Athlete Award

Elizabeth City State University
- Property Committee
- Honors Program
      - Mentor Program Chairperson
- Golf Club/Team

PALS
- Debutante Escort

NAACP
- Co-Chairman of Membership

EDUCATION

HIGH SCHOOL
HIGH SCHOOL DIPLOMA
MacArthur High School

YEARS ATTENDED (1993 - 97)
San Antonio, TX.

COLLEGE
CURRENT SENIOR
Elizabeth City State University

YEARS ATTENDED (1997 - 01)
Elizabeth City, NC.

INTERNSHIPS

GOHFAS- GODDARD HOWARD FELLOWSHIP IN ATMOSPHERIC SCIENCE 2000 W/ NOAA
- NORTH AMERICAN MONSOON EXPERIMENT (NAME)
- UNIFIED PRECIPITATION DATASETS
- MEXICAN PRECIPITATION DATASETS

(NASA) LARSS- LANGLEY AEROSPACE RESEARCH SUMMER SCHOLARS 1999
OFFICE OF NAVAL RESEARCH (ONR)
- REMOTE ACCESS SERVER
- SUNSCREEN EFS FIREWALL
- CISCO SWITCHES
- INTEL TEAMSTATION VIDEOCONFERENCING SYSTEM
- UNIX CONECTIVITY (WITH PC & MAC)
- SENSORSOFT CLIMATE MONITORING

ACHIEVEMENTS

-Goddard Howard Fellowship in Atmospheric Science (NOAA)
- Langley Aerospace Research Summer Scholar (NASA)
- GRE Score: 1430
- SAT Score: 1090
- Honor Roll fall 1998-99
- Honor Roll spring 1998-99
- Thurgood Marshall Scholar
- Mr. Sophomore class
- ONR Nurturing ECSU Research Program Award

SKILLS

Web mastering/ Web page design

Operating Systems:
- Unix
- Sun
- Irix
- Windows95/98
- Mac

Programming Languages:
- C programming
- C++ programming
- Fortran programming
- Ada programming
- Assembly Language
- HTML

* Other research and personal information can be viewed on my home page at: www.jag12.com

Satellite Imagery Research Team 2000-2001

Team Mentor:
Dr. Linda Hayden
Mrs. Wanda Hathaway

Team Members:
Keisha Harrison
Elizabeth Rascoe
William Griffin

The Satellite Imagery Team 2000-2001
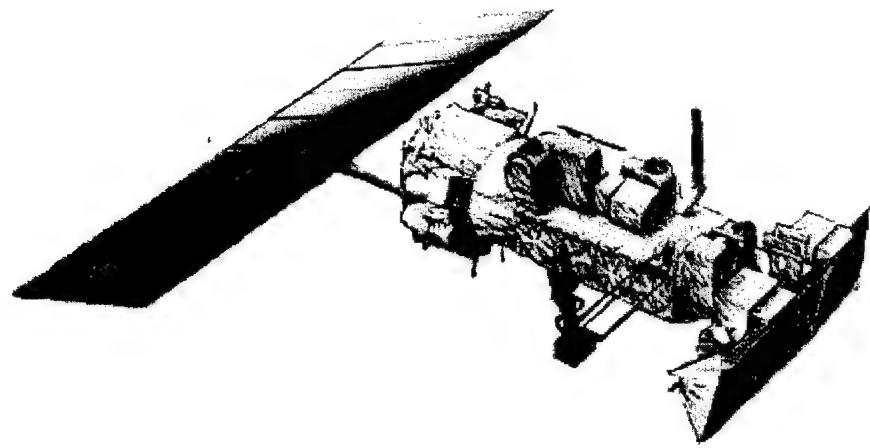
Mentor:

Mrs. Wanda Hathaway
Elizabeth City Middle School
306 North Road Street
252/335-2974 ext. 264
millpond90@hotmail.com

Team Members:

Keisha Harrison – http://nia.ecsu.edu/sp/kharrison/index.html
Elizabeth Rascoe – http://nia.ecsu.edu/sp/erascoe/Liz's%20Homepage.html
William Griffin

Abstract

The Satellite Imagery Team will use AVHRR (Advanced Very High Resolution Radiometer) to assist research in determining whether health concerns in aquatic recreational areas exist and identify sources of concern. In addition, AVHRR information will be utilized to identify the location of primary nurseries, the reasons for deterioration; this includes the adverse effects upon the fishing industry. Ground truthing will be used to determine the applicability of AVHRR to define present biological, chemical, and geochemical conditions in the wetland aquatic environments of a coastal biome.

Researchers will monitor radiometer readings by manipulation of CoastWatch data software for retrieving primary nursery locations, determining quantitative data on aquatic reproduction fish, and investigating locations of ditches and canals in prescribed areas of the Dismal Swamp and their current relationship to human activities.

The impact on CoastWatch usage is enormous on the economy of North Carolina. An important relationship exists between clean health environments and public health. A healthy environment will most certainly result in less strain on public health related budgets. Coastal fishing and shell fishing is 90 percent dependent on primary nurseries and the wetland which control nursery health. Near-ocean fishing is 70 percent dependent. The fishing industry generates 1.5 billion dollars plus annually. A clean water environment is also mandatory for the booming tourist industry of Northeastern North Carolina, and this factor adds many millions of dollars to the economic well being of the state. Research efforts on behalf of the Visualization Team with the use of cutting edge technology such as AVHRR will enlighten as well as inform citizens of North Carolina for a lifetime.

2

Review of Software

CoastWatch is a National Oceanic and Atmospheric Administration (NOAA) program that provides remotely sensed satellite and other environmental data to government decision makers and academic researchers. CoastWatch data is used in a variety of ways including: monitoring sea surface temperature, studying fish and marine mammal distributions, and aiding in atmospheric forecasting.

The primary data source for CoastWatch is Advanced Very High Resolution Radiometer (AVHRR) on the NOAA series polar orbiting weather satellites. The AVHRR sensor measures radiance from the earth in five bands or channels with 1.1 km resolution at nadir.

Channel	Wavelength Band	Primary Use
1	0.58-0.68 (visible)	Daytime cloud, snow and ice mapping data
2	0.72-1.10 (near-IR)	Surface water delineation, vegetation and agriculture assessments
3	3.55-3.93 (infrared)	Nighttime cloud mapping, sea surface temperature measurements, land and water distinctions, and hot spot detection such as volcanic activity and forest fires
4	10.30-11.30 (infrared)	Cloud mapping sea and land surface temperature measurements, and sol moisture and volcanic eruption data
5	11.50-12.50 (infrared)	Sea surface temperature measurements and soil moisture data

Satellite estimates of sea surface temperature (SST) are made by converting the radiance measured in the infrared channels to brightness temperature and then using a multi-channel technique to calculate SST to within +-0.5 degrees Celsius. Cloud identification masks are also created using visible and infrared channels with a series of spectral gradient, difference, and threshold tests.

AVHRR is a scanner that senses in the visible, near-infrared, and thermal infrared portion of the electromagnetic spectrum. AVHRR data is acquired in three formats: High Resolution Picture Transmission (HRPT), Local Area Coverage (LAC), and Global Area Coverage (GAC). HRPT data are full resolution image data transmitted to a ground station as they are collected. The average instantaneous field-of-view of 1.4 milliradians

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yields a HRPT ground resolution of approximately 1.1 km at the satellite nadir from the nominal orbit altitude of 833 km (517 miles). LAC are full resolution data that are recorded on an on board tape for subsequent transmission during a station overpass. The average instantaneous field-of-view of 1.4 milliradians yields a LAC ground resolution of approximately 1.1 km at the satellite nadir from the nominal orbit altitude of 833 km (517 miles). GAC data are derived from a sample averaging of the full resolution AVHRR data. Four out of every five samples along the scan line are used to compute one average value and the data from only every third scan line are processed, yielding 1.1 km by 4 km resolution at the subpoint.

The AVHRR sensor provides global on board collection of data from all spectral channels. Each pass of the satellite provides a 2399 km wide swath. The satellite orbits the Earth 14 times each day from 833 km (517 miles) above the surface.

The average instantaneous field-of-view of 1.4 millradians yields a LAC/HRPT ground resolution of approximately 1.1 km at the satellite nadir from the nominal orbit altitude of 833 km. The GAC data are derived from an on board sample averaging of the full resolution AVHRR data yielding 1.1 km by 4 km resolution at nadir.

To access CoastWatch data requires a username and password. They are obtained by filling out an online registration form and agreeing to the provisions. Users are then notified by e-mail of their user name and password. Once registered CoastWatch users can download data files for use with CoastWatch software packages, plotting data using the online preview, or converting data to other data formats for use in GIS or scientific plotting packages.

A variety of software packages for DOS, Windows 95, and UNIX are available to manipulate and display CoastWatch data files. CoastWatch data is stored in a special binary format not recognized by normal image display programs.

NOAA CoastWatch sea surface temperature (SST) Images are produced on NEDIS' Central Environmental Satellite Computer System (CEMSCS) using data from AVHRR data four times daily for all the coastal waters of the United States. Near real-time data may be obtained from the Regional Nodes; retrospective data may be obtained from the Satellite Active Archive (SAA).

The Internet is used as the primary telecommunications pathway for digital data distribution. Once data is delivered to the CoastWatch Regional Nodes they become available for local use by state, local and federal marine scientists and decision makers. A growing number of federal, state, and local organizations are establishing a formal relationship with local CoastWatch Regional Nodes for routine timely access to CoastWatch image products. Retrospective availability of CoastWatch data products and buoy data are provided through a remotely accessible, near line system at SAA.

Introduction

Several important topics were researched using CoastWatch data. These topics include: locating primary nurseries, determining data on aquatic reproduction of fish, shell fish, and plant life in nurseries, determining nutrient levels in aquatic environments, determining the location of ditches and canals in prescribed areas of the Dismal Swamp and their current value or relation to human activities, and determining the water table pulsing and surface water in the boardwalk area of the Dismal Swamp on a weekly schedule.

The Dismal Swamp is located in southeastern Virginia and northeastern North Carolina. It is densely forested and contains scattered natural elevations of 27 to 15 feet above sea level. Although the swamp is now only a fraction of its original size, it still exerts the same fascination that prompted generations to explore it, write about it, and try to conquer it. The original stand of virgin forest is gone. The last reported ancient tree with a twelve-foot diameter fell in July 1997 after being struck by lightning. The Great Dismal Swamp National Wildlife Refuge was formed in 1974 when the Union Camp Corporation donated 49,000 acres of forested wetlands to The Nature Conservancy. The Refuge consists of over 107,000 acres, with Lake Drummond, a 3,100 acres natural lake in the center of the Swamp.

The overall bearings of the topics researched on the economy of North Carolina are enormous. Coastal fishing and shell fishing are 90 percent dependent on primary nurseries and the wetlands that control nursery health. Wetlands perform as natural filters that clean the nutrients and sediments from waters that drain into the estuaries.

Near ocean fishing is 70 percent nursery dependent. The fishing industry generates 1.5 billion dollars plus annually. A clean water environment is also mandatory for the tourist industry of northeast North Carolina, and this factor adds many millions of dollars to the economic well being of the state.

Aquatic Reproduction of Plant Life, Fish and Shell Fish

There is usually a definite competition that takes place in an aquatic community between the algal and rooted plants for available space and nutrients. The balance between the two is delicate and the addition of excessive nutrients to the system favors the overpopulation of the phytoplankton. There is evidence that dense stands of submersed rooted aquatic plants may bind up nutrient materials throughout the growing season so that they are not available for production of phytoplankton and the organisms that feed upon phytoplankton, this means that although fish hatches would be large, the chances for larval survival would be greatly diminished. The survival rate of fish beyond forage size is inversely proportional to the size of fish that reach maturity. Fish are involved in a number of stimulus-response reactions that lead directly to the act of spawning. The action of plants as triggers in spawning does not seem to be a well-studied area.

Temperature varies in ponds and lakes seasonally. During the summer, the temperature can range from four degrees near the bottom to twenty-two degrees at the top. During the winter, the temperature at the bottom can be four degrees while the top is 0 degrees (ice). In between two layers, there is a narrow zone called the thermo cline where the temperature of water changes rapidly. During the spring and fall seasons, there is a mixing of the top and bottom layers, usually due to winds, which results in a uniform water temperature of around four degrees. This mixing also circulates oxygen throughout the lake. Of course there are many lakes and ponds that do not freeze during the winter, thus the top layer would be a little warmer.

The Nu-Quality seafood restaurant helped out our research a lot. By talking to one of the managers, it was a big help to us. The manager informed us that their business usually deals with the Albemarle and Currituck Sound when they send their boats out to

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search for various aquatic products for their business. He also mentioned that depending on what type of aquatic animal it is determines the season on which it is best to navigate the sound. Also over the past few years he mentioned that production was improving.

Located in the sound are indeed nurseries for many fish. Sunlight penetrates shallow water. Creeks, swamps and marshes supply organic matter that is converted to nutrients. These nutrients, in turn, feed growths of algae, or phytoplankton, that are the foundation of the food web. As plankton bloom in Sound waters, stripped bass, shad and herring swim upriver to spawn. When the eggs hatch, the young drift downstream to feast on a ready-made food supply. At the same time, Atlantic croaker and spot are spawning in the ocean. Their youngsters drift into the Sound and settle in shallow bays and coves to feed. This all works to a rhythm of sun and seasons, which has been perfected over millennia. The sound is host to resident fish, too, those that live here year-round. Catfish and perch have become important resources as traditional catches of herring and striped bass have declined. And as salt water creeps toward western shores in dry summers, commercial and recreational fishermen alike seek the blue crab.

At least 17 kinds of waterfowl spend the winter here, including Canada and snow geese, black duck and scaup.

Canals and Ditches in Prescribed Areas of the Dismal Swamp and their Current Value to Human Activities

In addition to the importance of aquatic life in the Dismal Swamp there are several other attributes that demonstrate its value and importance to humans and species.

The Great Dismal Swamp is composed of several ditches and canals. A ditch is defined as a long narrow channel dug in the ground, usually used for drainage or irrigation. Canals are defined as artificial waterway for use of shipping, for irrigation, or for recreational use. They may also be part of natural rivers along its course.

The Dismal Swamp Canal is among the many canals and ditches located in the Dismal Swamp. The Dismal Canal connects the Chesapeake Bay in Virginia via the Elizabeth River and the Albemarle Sound in North Carolina via the Pasquotank River. This is the oldest man-made canal in the United States. In 1794 digging of the canal began and was completed after twenty-two years of back-breaking work. Slaves from

nearby owners dug the entire river by hand. By 1820 the canal was recognized as an important part of commercial traffic between Virginia and North Carolina. In the 1860's and the onset of the Civil War put the canal in an important strategic position for Union and Confederate forces. Wartime activity left the canal in a terrible state and disparately needing repair.

In addition to the Dismal Swamp canal the Dismal Swamp contains the Cross Canal and the Branch Canal. Their also numerous ditches including the Railroad, Jericho, East, Portsmouth, Spillway Feeder, Laurel, Myrtal, and Western to name a few.

Lake Drummond has a shallow basin within the central region of the Dismal Swamp. The lake basin is round and possibly originated from a deep burn of the peat. Excessive drainage and rainfall into the lake result in water leaving the lake through a spillway located at its eastern margin and entering the feeder ditch, and flowing directly into the Dismal Swamp Canal. During periods of excessive use and water or summer droughts, the water in the canal often decreases to a level that will not allow the passage of boats. In past cases water from the lake has been used to maintain its operation.

With use of the CoastWatch data these ditches and canals were not able to be located. The primary use for the CoastWatch datasets available is to analyze sea surface temperatures. The level of detail available is not a resolution conducive to projects requiring high levels of detail. As you can see in the figure 1.1 the dataset represents the eastern portion of North Carolina. A topographic map is also represented in figure 1.2 to insure a clear understanding of the proximity of the Dismal Swamp using CoastWatch data.
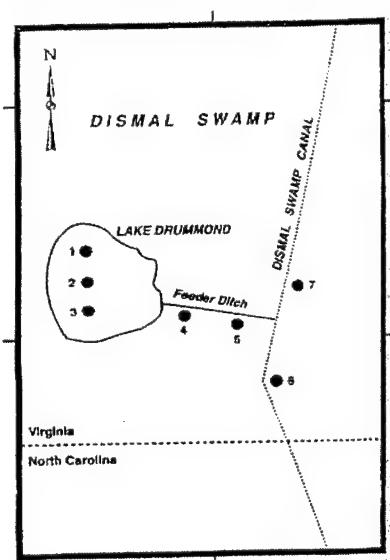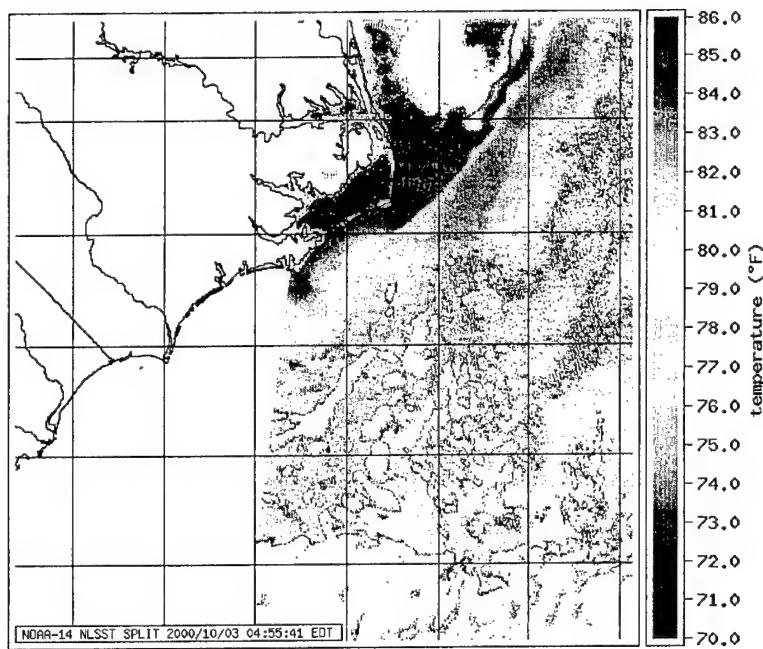
Figure 1.1 CoastWatch Dataset for November 2000
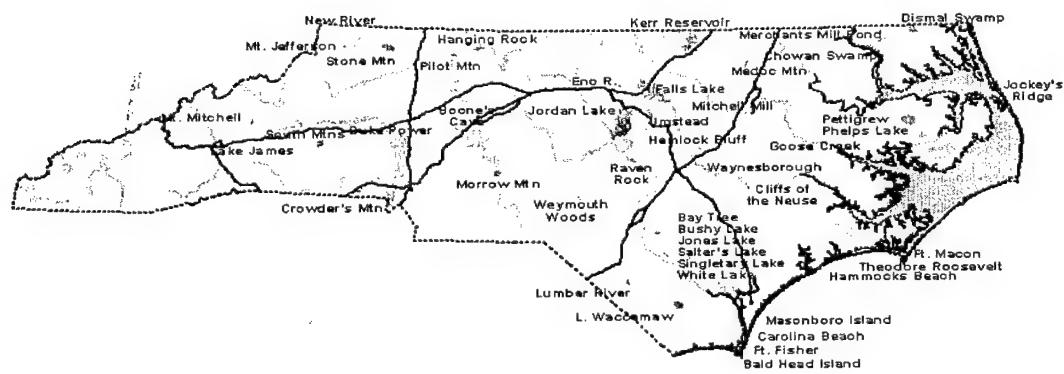
Figure 1.2 Topographic map of North Carolina

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Using an aerial photo is more appropriate for locating ditches and canals. If CoastWatch data is to be used for analyzing ditches and canals it should be done in addition to other geospatial data. Figure 1.3 is an example of an image from the east coast on March 26, 2000 using MODIS satellite data. This data allows you to clearly distinguish fluvial systems that are inland.

While CoastWatch can't be used to determine the location of ditches and canals it does have several indirect advantages to aid in analyzing the swamp. The water in the Dismal Swamp must be at a temperature that will provide a comfortable environment for species and one that will enable

Figure 1.3 MODIS satellite data

the growth of plants and vegetation in the swamp. If the water temperature becomes to low or high animals may die or be forced to migrate to a different habitat. Many animals such as the musk rat for example, digs burrows near ditches. Ditches and Canals make up a very important part of the species habitat.

While ditches and canals are important to the swamp they also have had several adverse effects on the swamp. Constructed canals combined with agricultural runoff, and lumbering operations have deteriorated the effective role that the swamp plays in providing clean water runoff at controlled rates for the estuaries and primary nurseries along their fringes. Without these controls the nurseries will cease to function, and most of the animal life in the coast of North Carolina will disappear.

Currently humans reap several advantages to ditches, canals and Lake Drummond. These activities include birding, hiking, biking, fishing, boating, hunting, wildlife observation, and photography. Some of these activities are due to the array of species and wildlife that make up the swamp.

The Swamp supports a variety of mammals, including otter, bats, raccoon, mink, gray and red foxes, gray squirrel, white-tailed deer, black bears and bobcats. Three

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species of poisonous snakes and 18 non-poisonous snakes can also be found in the Dismal Swamp. The poisonous snakes are the cottonmouth, canebrake, and rattler.

Some of the plants found in the swamp include the dwarf trillium, silky camellia, and log fern. The dwarf trillium is located in the northwestern section of the swamp and blooms briefly each year for a two-year period in March. Silky camellia is found on hardwood ridges and in the northwestern corner of the refuge. The long fern, one of the rarest American fern, is more common in the Great Dismal Swamp than anywhere else.

Over two hundred species of birds have been identified on the refuge since its establishment; ninety-three of these species have been reported nesting on the refuge. Two southern species, the Swanson's warbler and the Wayne's warbler, are very common in the Dismal Swamp. Other birds include the wood duck, barred owl, pileated woodpecker, and prothonotary warbler.

In 1973 the Great Dismal Swamp National Wildlife Refuge was created. Before the refuge was established the swamp underwent several stages of change and deterioration. One of these changes took place when over 140 miles of roads were constructed to provide access to timber in the swamp. These roads greatly disturbed the swamps water flow, since the ditches were dug to provide dirt for the road beds drained water from the swamp. The roads also blocked the flow of water across the swamps surface, flooding some areas of the swamp with stagnant water.

The primary purpose of the refuge is to restore and maintain the natural biological diversity that existed prior to human-caused alterations. Essential to the swamp ecosystem are its water resources, native vegetation communities, and varied wildlife species. Water is now being conserved and managed by placing water control structures in the ditches. Plant community diversity is being restored and maintained through forest management activities that simulate the ecological effects of wildfires. Wildlife is managed by insuring the presence of required habitats, with hunting used to balance some wildlife populations with available food supplies.

There are five major forest types and three non-forested types of plant communities that comprise the swamp vegetation. Atlantic White-Cedar, Maple-Black Gum, Tupelo-Bald Cypress, and Sweet Gum-Oak poplar make up the major forested types.

The Atlantic White Cedar is a moderate to slow growing tree that may live for more than 1,000 years. It flowers in early spring, and the fruits mature in one growing season. Seed production usually begins when the trees are five to ten years old. In the 1700s the wood was used for log cabins, roof shingles, barrels, and boats. But this soon depleted the limited supply. Then it was learned that fallen tree trunks that had been buried for many years could be used because the wood was still in excellent condition. Other uses have included piers, telephone poles, piling, and ties. The non-forested types include a remnant marsh, a sphagnum bog, and evergreen shrub community. Currently red maple is the most abundant and widely distributed plant communities due to the lingering effects of past forest cutting, extensive draining, and the exclusion of forest fires. Tupelo-bald cypress and Atlantic White-Cedar, formerly predominant forest types in the swamp, today account for less than 20 percent of the total cover.

In addition to the deteriorations of the swamp previously discussed the Great Dismal Swamp has been drastically altered by several other human activities. Commercial and residential development destroyed much of the swamp, so that the remaining portion within and around the refuge represents less than half of the original size of the swamp.

Using Landsat satellite data from different years can demonstrate which areas were burned. Using GOES-8 satellite data can detect areas while they are in the process of burning.

Conclusion

There are several factors that may have contributed to our results. Some of these factors may have included cloud cover, tree cover and the size of ditches and canals.

The Dismal Swamp plays a very important part in the lives of a wide range of species as well as humans. It is imperative that we continue to protect it by setting and enforcing rules and regulations, as well as monitoring it with the use of a wide range of sophisticated technology. CoastWatch combined with other forms of geospatial data and ground truthing will aid in monitoring and correcting problems that may have adverse effect on the swamp.

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EDUCATION

1997-2001	Elizabeth City State University	Elizabeth City, NC

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EXPERIENCE

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Student Researcher

- Member of Visualization Team.
- GOES-8 satellite data used to conduct research on atmospheric absorption.

06/00-08/00	Environmental Monitoring Department	Madison, WI

Student Researcher

- Used visualization technology, Landsat-7 satellite data, DEMs and other geospatial information to interpret the best location for a truck safety and weight enforcement facility.

05/99-07/99	Ronald McNair Program	Elizabeth City, NC

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- Eagle Honor Award, Office of Naval Research Award, Incentive Scholarship Award, Academic Award of Achievement, Vice's Chancellors List, Academic Achievement Award-Track and Field, MVP-Track and Field and James T. Jackson Athletic Christian Award.

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- Java, C/C++, COBAL, Fortran, HTML, SQL.

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Work Experience

5/00 - 6/00 Inventory Personnel
Orthotics and Prosthetic National Office, Alexandria, VA
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Corel Word Perfect 6-9, Windows 95&98, Microsoft Word,
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Clerical Work

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New Millennium Scholar 1999 - present
Sports Info. Dir. Asst., Elizabeth City State University 1999 - Present
ONR Research Program 2000 - present

Mathematics of the Great Dismal Swamp Research Team 2000-2001

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Consltants:

Dr. Maurice Powers, Mrs. Sue Powers, Mr. Omari Salisbury

Team Members:

(front left-to-right) Shawneque Reid, Eunice Smith and Carl Seward, (back) Kenyatta Lee

Mathematics of the Great Dismal Swamp
Research Team for Academic Year 2000 – 2001
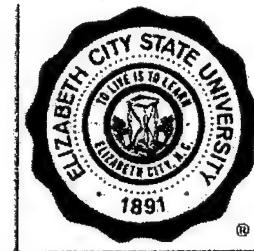
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Mathematics of the Great Dismal Swamp
Research Team Abstract

The primary focus of this research was to make connections between mathematics and the existing Great Dismal Swamp research projects that assisted us in developing lesson plans for students in grades pre-K through grade 2. The Mathematics of the Great Dismal Swamp Team reviewed results of faculty and student research projects to identify sources used in the mathematics preparation of children at this grade level. We then produced educational lessons, which incorporated mathematical concepts from the data collected.

We realize the importance of the mathematical developments, which occur in students in grade pre-k through grade 2. Thus, this project was designed to build on the curiosity and enthusiasm of children as it relates to the study of mathematics. Appropriate mathematical experiences were designed to challenge young children to explore ideas related to data analysis and probability, measurement, mathematical connections, algebraic concepts, and numerical operations. The National Council of Teachers of Mathematics lists these topics as those which young children should be exposed to as early as pre-k through grade 2.

The lessons developed have been produced on a folded poster and submitted to NASA's Earth Science product review committee. The review criteria and guidelines are available at http://www.strategies.org/ESEReview.html. The team worked closely with the multimedia team, whose research project will produce the image of the Swamp to be displayed on the front of the poster.

Revised: April 11, 2001

Lesson Plan Topic 1: Algebra

A.   State the Standard.
In creating a lesson plan for grades Pre-K through grade 2 in the subject Algebra, we first had to go to the National Council of Teachers of Mathematics (NCTM) website (http://www.nctm.org) to learn the standards. We found that the elementary level standards outlined the same topics as all other grade levels, but simplify the material covered. Some of these objectives outlined were: (1) Analyze how both repeating and growing patterns are generated. (2) Illustrate general principles and properties of operations, and (3) Sort, classify, and order objects by size, number, and other properties. With these and many other objectives outlined in the NCTM standards, we chose to focus on the following objective: to enable the students to use mathematical language and symbols to express numerical and other relationships. (Algebra Standards 1)

B.   What Initial Ideas Were Conceptualized.
When we first started brainstorming this topic, we were completely lost. So many ideas were running through our heads. Our question was, "How in the world are we supposed to come up with a lesson plan suitable for the target grades on a high school level topic?" However, the NCTM standard cleared this up for us.

After much research, we learned that children develop concepts related to algebra even before formal schooling. They develop this concept through repetitive songs, rhythmic chants, and predictable poems. Their observations and discussions of how quantities relate to each other signal the representation of mathematical situations. After many revisions to the lesson plan, we finally created a well-prepared lesson.

C.   Algebra Lesson Plan Review.
Although there are many different animals found in the Great Dismal Swamp, we narrowed the selection down to three groups: birds, snakes, and turtles. To tie the two topics of mathematics and the Great Dismal Swamp together, we have the children solve basic mathematical problems such as
4 turtles + How many snakes = 10 reptiles.

The first thing we did was outline the lesson goal, which is to use mathematical language and symbols to express numerical and other relationships. We follow that up with the introduction to the topic, which outline the different animals that inhabit the Great Dismal Swamp. During this time, the teacher is to provide an exercise, such as giving the students basic information about each of the animals presented. The teacher should then break the class into three groups assigning a name to each group. The teacher shall use: snakes, birds, and turtles for group names.

The lesson plan is divided into two days. The teacher is to use the "Mathematics of the Great Dismal Swamp" poster, however, the teacher may elect to go to the Internet and find the pictures. The first day will consist of the actual division of students into respective groups. The teacher is to give each group three pictures of different types of animals according to their group name (i.e. Bird Group: three different types of birds). The teacher is to then provide background information about each animal. Then, have three students from each group report to the class about the animals that were in their group and post the animal pictures on the board. Also, the lesson plan has made it optional for the teacher to ask students to research the animals in more detail.

The next day, with the pictures still posted on the board, have a student from each group give a fact or two on the animal in his/her group. Using the animals as symbols or variables, create mathematical problems for the students to solve (i.e. 4 turtles + How many snakes = 10 reptiles). Have the students return to their group and assign two or three problems to each group. Ask a student from each group to present one math problem to the class and explain how they arrived to that answer.

D.   How the Lesson Plan Relates to the Great Dismal Swamp.
In the lesson plan, we use animals that are inhabitants of the Great Dismal Swamp. We use these animals to show the basic principles of addition and subtraction, along with showing the student that we can use animals or variables to represent numbers.

Lesson Plan Topic 2: Connections.

A.   State the Standard.
The standard for connections, as stated by the National Council of Teachers of Mathematics, says that the most important connection for early mathematics development is between the intuitive, informal mathematics that the student has learned through their personal experiences and the mathematics being learned in school. Also, it states that all other connections between one mathematical concept and another mathematical concept are supported by the link between the students' informal experiences and more-formal mathematics. (Connections 1)

B.   What Initial Ideas Were Conceptualized.
In the beginning of the project, my two original lesson plan topics were Problem Solving and Representation. After the first lesson plan Problem Solving was finished I ran into my first obstacles with Representation. While trying to compose a lesson plan for Representation, I was having trouble coming up with a classroom activity that was not to advance for grades Pre-K through grade 2. Looking back at the original ten Standards stated by the National Council Teachers of Mathematics, we decided to use Connections instead of Representation.

C.   Connections Lesson Plan Review.
The lesson plan's central objective is to teach students in the elementary grades the basic concepts of connections. In the lesson plan created, the primary goals were to (1) Enable

students to understand how mathematics ideas interconnect and build on one another to produce a coherent whole, (2) Recognize and apply mathematics in contexts outside of mathematics (3) Enable students to use mathematics of patterns to investigate and quantify syllables in names.

Before the teacher introduces the lesson, the students should have knowledge on what a syllable is. First the teacher will give a list of animals that live in the swamp to the class. The teacher will then clap out a name of an animal (one clap for each syllable) on the list. The teacher should then ask the class if they could figure out what animal was clapped out. They will realize that the clapping matches the names of several animals. The classroom will then begin to determine which animals had the same number of claps in their names.

To make this easier, draw a chart and add the animals' names as the class identifies the number of beats in a name. Have the students come up with equations with the number of syllables in each word. Example: Black Bear (1+1=2), Woodpeckers minus frog (3-1=2).

D.   How Does It Relate to the Great Dismal Swamp
This lesson plans relates to the Great Dismal Swamp by using animals names' that live in swamp, so the students can clap out each syllable in the animals name.

Lesson Plan Topic 3: Data Analysis and Probability

A.   State the Standard.
The standard for Data Analysis and Probability as stated by the National Council of Teachers of Mathematics, http://www.nctm.org/document/chapter4/data.html, says that "comparing, classifying, and counting activities can provide the mathematical beginnings for developing young learners' understanding of data, analysis of data, and statistics." It also states that, "students should pose questions to investigate, organize responses, and create representations of their data."

The data/analysis and probability standard also discusses ways to formulate questions that can be addressed through the collection and organization of relevant data to answer questions. It states that students in the early grades have "an inclination to ask questions" and it must be nurtured. At the same time, as stated the the NCTM Standard, the teacher "should help [students] develop ways to gather information to these questions, so that they learn how to make decisions on the basis of data." (Data Analysis and Probability 1)

With respect to organization of data, the NCTM Standards states that data should begin with informal sorting experiences, such as helping to put away groceries; an activity that a student at this age level can visual understand. These experiences and conversations should focus the student's attention on the characteristics of the objects, therefore creating an understanding of the concept "things that go together."

B.   What Initial Ideas Were Conceptualized

In the beginning of this project, we came up with several ideas that we believed would tie into the mathematics standards and the Great Dismal Swamp. One of the first ideas conceptualized was having students be able to identify different types of trees that are found in the Great Dismal Swamp, such as the Loblolly Pine and the Bald cypress. After the students learned about the trees, they were then asked to identify characteristics of the leaves found on the trees, and place them into groups such as large, small, green, brown, followed by showing a representational graph of the characteristics. The reason why this lesson was not used was because we felt that the lesson in and of itself was too advanced with respect to the information asked of the student. We too believe that it also would have been better served in another mathematical lesson topic, reasoning and proof.

C.   Data Analysis and Probability Lesson Plan Review
The lesson plan's central objective is to teach student in the elementary grades the basic concept of data analysis and probability. In the lesson plan created, the primary goals were to (1) Enable students to sort and classify wildlife found in the Great Dismal Swamp according to their attributes (i.e. color and size) and organize data about the wildlife, and (2) Enable students to represent data using concrete objects, pictures, and graphs and formulate questions that can be addressed with this data. These primary goals are flexible for the teacher to manipulate in whatever way he/she feels is adequate for his/her classroom setting.

The teacher should set aside time before the formal introduction of the lesson to capture the attention and interest of the student, by telling them about the topic to be discussed and how it can relate to a practical application in the students life. The teacher may use short activities, problems, or other appropriate means to further discuss and demonstrate the student's current knowledge of the given topic. The information gained from this opening session will enable the teacher to build upon the understanding of the students. The time length for any session before entrance into the main lesson is at the teacher's discretion according to the level of understanding the students have toward the given topic.

The teacher, in addition, is to provide opportunities for students to solve problems, to make, explain, and defend answers, and to extend their knowledge by making generalizations. These opportunities are again to be within reason with respect to the age group of the student. When we say, "defend answers", unlike a dissertation for a doctoral student or a thesis from a master's degree candidate, the student is only expected to give a generalized answer that is reasonable or at least conceivable.

In this lesson of data analysis and probability, in which we decided to focus on data analysis, we ask the students to be able to sort and classify wildlife found in the Great Dismal Swamp. The first thing that the lesson plan suggests is that the teacher pin up the "Mathematics of the Great Dismal Swamp" poster in a location that can be seen by the students. However, in recognizing that the poster can only be so big, in the resources section of the poster, the teacher may elect to find the pictures of these animals on the internet, and they can enlarge the pictures to what they deem is appropriate. On the poster are five pictures of animals found in the Great Dismal Swamp. Two of the

animals are birds: the Carolina Chickadee and the Carolina Wren; two amphibians: Bullfrog and Southern Leopard Frog; and one reptile: the Eastern Box Turtle. Some students may not be familiar with birds, reptiles, and amphibians. In this case, the teacher is to use an introductory activity to introduce these classifications of animals. Then, the teacher is to ask the students to group the animals by these classes (i.e. bird, reptile, amphibian). After the students have sorted these animals, the teacher is to ask the students how many of each type of animal (bird, amphibians, and reptiles) do they see. It should be two birds, two amphibians, and one reptile.

By this time, the student has sorted and classified the group of animals. This meets the first lesson goal outlined in this lesson plan. Next, the student is asked to draw a bar graph representing each animal and representing the number of each animal on the same bar graph. The teacher should give step-by-step instructions on how to draw the bar graph. On the x-axis, the teacher is to place the names of the names and on the y-axis place the numbers 1 through 4. A copy of the following graph is also on the lesson plan, to show the teacher how the graph should look.
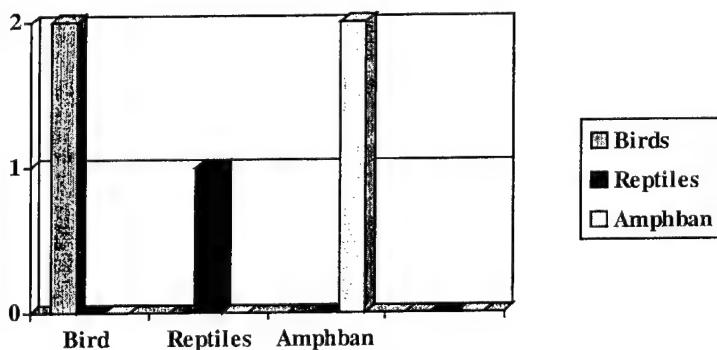
At the closure of this lesson, the teacher is to ask questions based upon the graph that they have drawn. Questions such as: According to the graph, how many animals are represented? According to the graph, how many reptiles are there? According to the graph, how many birds are there? According to the graph, how many amphibians are there? The teacher should also ask which animal has the most and lease representation on the graph. The students should see something very interesting when asked this. They should see that there are an equal number of birds and amphibians.

D. How the Lesson Plan Relates to the Great Dismal Swamp
In the lesson plan, the main objects used to incorporate the standard of data analysis and probability is the five animals that are found in the Great Dismal Swamp. These animals as stated earlier are: the Carolina Chickadee, the Eastern Box Turtle, the Bullfrog, the Carolina Wren, and the Southern Leopard Frog. The lesson plan was targeted to address the Great Dismal Swamp, but only addresses animals found in the swamp. The teacher is strongly encouraged to research the animals outlined to expound on this lesson.

Lesson Plan Topic 4: Measurement

A.   State the Standard

There were several expectations and standards stated for measurement for grade levels pre-kindergarten through second grade listed on the National Council of Teachers of Mathematics (NCTM) website: http://www.nctm.org. We used a portion of each of the stated standards by having the students to "recognize the attributes of length..." and "compare and order objects according to these attributes." Students are expected to "understand how to measure using nonstandard and standard units." (Measurement 1) Duplicates of the same units will be used. The students will "develop common referents of measurement to make comparisons and estimates." (Measurement 1)

B.   What Initial Ideas Were Conceptualized

While brainstorming ideas of what would make a good lesson, we came up with a few solid ideas. Measurement is a part of most math classes. At an early age, students are exposed to measurement standards. One of our first ideas was to refer to a few plants located in the swamp, such as those of the black gum or even pine tree. The students would measure the leaves of the trees using a nonstandard tool and standard tool. Then they would compare the two methods used. The importance of standard measurement would then be introduced. Another idea was to idea was to talk about a couple of animals that most children are familiar with that are located in the swamp, such as deer, turtles, squirrels, bears, or birds. The sizes of the animals would be compared and contrasted. Our final idea was to focus on one animal that the students could easily relate to. The length of this same animal would be measured, and the results of the students would be analyzed.

C.   Measurement Lesson Plan Review

The measurement lesson plan was centered on finding the length of a turtle. There were three learning goals. One, the student will be exposed to different methods of linear measurement. Two, the student will recognize the importance of standard measurement. Three, the student will recognize the importance of standard measurement. Three, the student will develop similar references for measures to make comparisons and estimations. These goals should be achieved throughout the lesson.

The teacher was given a short introduction to the topic, followed by brief information to share with the students. Information about turtles should be given to the students. For example, the students should be informed, "There are over 200 types of turtles throughout the world. Yellow-bellied and spotted turtles are found often in the swamp." To make the lesson more interested, real turtle shells or turtles should be brought in for the students to see. A picture of a spotted turtle has been provided on the lesson plan.

The classroom activity had several steps that should be used at the discretion of the teacher. First, the students are asked to draw their own turtles. Second, the students are separated into small groups (2-5 students). Next, pieces of thread are passed out to half of the groups of students. The other half of the groups should be given paper clips. Then, the teacher is asked to show the students how to measure the length of the turtle from head to tail, using the items given. The teacher should show the students how to link paper clip links to find the length and mark off thread. After the students have measured their turtles, each group should bring their paper clip links and thread to a specific location, such as a table.

The students should be allowed to examine the results of each other's measurement results by comparing lengths of thread and paper clip links. Then, the standard measurement unit of the centimeter should be introduced by way of measurement tape or a ruler. The teacher is then suggested to select students from each group to measure a turtle in centimeters. As closure, the students will review what they've learned about turtles and the Great Dismal Swamp. Lining the turtles on a display, such as a log would be a nice way for the students to show off their work. Finally, the teacher may ask the students to explain orally or in writing, how to measure a turtle.

D.   How the Lesson Plan Relates to the Great Dismal Swamp
This lesson is centered on turtles. Turtles are animals that live in the swamp and other places throughout the world. Spotted and yellow-bellied turtles are often seen in the swamp. We decided to use this animal because most students can identify with turtles. The teacher is also given websites for more information on turtles and the Great Dismal Swamp.

Lesson Plan Topic 5: Numbers and Operations

A.   State the Standard.
We found several goals and expectations for the Numbers and Operations Standards from the National Council of Teachers of Mathematics (NCTM) website (http://www.nctm.org). Its first goal was to instruct the student to understand numbers by means of representation, relationships, and systems of numbers. The expectations for the grade levels of pre-kindergarten through second grade went as follows. They are expected "to count with understanding and recognize "how many" in sets of objects." (Numbers and Operations 1) A sense of whole numbers should be developed, represented, and used in flexible ways. The student should "develop and use strategies for whole-number computations, with a focus on addition and subtraction." (Numbers and Operations 1)

B.   What Initial Ideas Were Conceptualized.
We had two main ideas for this lesson plan when we first began. The first idea was to count different plants and/or animals. For example, we would begin by talking about the different types of wildlife that reside in the swamp. We would then go on to talk about what plants and animals also live in the students' community. The students would compare and contrast the two. As an activity, they would count how many squirrels or

turtles or trees there were in a given environment. The second idea included trees also, but from a different perspective. It was to focus on determining the age of a tree.

C.   Numbers and Operations Lesson Plan Review.
The number and operations lesson plan focused on counting. This lesson had three learning goals. One, the student will be able to understand counting concepts. Two, the student will be able to connect numbers using addition and subtraction. Three, the student will be introduced to the significance of numbers in nature. These goals should be accomplished throughout the lesson plan.

The teacher was given a short introduction to the topic, followed by brief information to share with the students. From this information, the students are introduced to facts about the swamp and trees. For example, the teacher is suggested to say to the students, "Each year a tree lives, an additional layer is added on. The result of these layers is several rings." This is vital information that the students will need.

The classroom activity had about five basic steps. First, the teacher would post pictures of two sets of tree rings in front of the classroom. Examples are located on the lesson plan. Second, the students are asked to draw numbers from a container (e.g. 8-30). The teacher is asked to show the students how to illustrate tree rings. Next, the students themselves should draw tree rings according to the number that was drawn out of the container. Then, the students are allowed to post their illustrations in order of youngest-to-oldest or vice versus. Finally, they are asked to compare the ages of the trees. For example, the teacher may ask, how much older is the oldest tree than the youngest tree. How many more rings does a tree that is 20 years old have that one that is 15 years old? As closure, the students are allowed to review what they've learned by drawing pictures or writing a few sentences about trees, their environment, and the swamp.

D.   How Does the Lesson Plan Relate to the Great Dismal Swamp?
In the beginning of the lesson, we discuss trees that are located in the Great Dismal Swamp. Five of these types of trees have been forested; they consist of pine, sweet gum-oak popular, maple-black gum, tupelo bald cypress trees, and the Atlantic white cedar. Cypress wood is quite common in construction because the trees produce durable wood that is chemical resistant. Trees have rings that become visible when wood is cut. We deemed that counting tree rings should be an excellent way to incorporate parts of the plant community of the swamp. The teacher is given various websites to gain more information about trees and the Great Dismal Swamp.

Works Cited

The National Council of Teachers of Mathematics: Algebra Standards.
    http://standards.nctm.org/document/chapter4/alg.htm

The National Council of Teachers of Mathematics: Connections Standards.
    http://standards.nctm.org/document/chapter4/conn.htm

The National Council of Teachers of Mathematics: Data Analysis and Probability.
    http://standards.nctm.org/document/chapter4/data.htm

The National Council of Teachers of Mathematics: Measurement Standards.
    http://standards.nctm.org/document/chapter4/meas.htm

The National Council of Teachers of Mathematics: Number and Operations Standard.
    http://standards.nctm.org/document/chapter4/numb.htm

Recommendations

Several recommendations were given during our oral presentation. They went as follows:

1. Quote standards in final report.
2. Be precise and specific. Look at one level, such as Pre-K or first grade.
3. Use Blooms Taxonomy.
4. Be more creative.
5. Spend time in classrooms.
6. Give the names of classifications of standards.
7. Just state the standards.
8. Show materials in layout of lesson plan.
9. Get rid of the decimals on the graph.
10. Test the models in classrooms.
11. Pay close attention to the style of North Carolina layout of lesson plans.
12. Put subtraction in explanation of number and operations lesson plan.
13. Include a recommendations page discussing what would be the next stage of the project.
14. Sort through the ideas presented, select the best ones, and refine.

Multimedia Research Team
2000-2001

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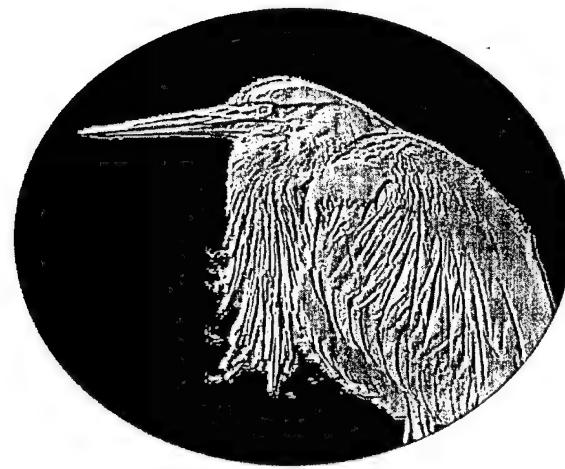
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Presentation Date
April 19, 2001

Abstract
http://198.85.48.116/mmt_2001/Abstract.html

The Great Dismal Swamp Wetlands and Wildlife Refuge is a heavily forested area of land and water located in Suffolk and Chesapeake, Virginia stretching south into North Carolina in the counties of Gates, Camden, and Pasquotank. The refuge has been used to make the public aware of the essential role that wetlands play in the coastal plains area. It has also been used for research and educational purposes.

The goal of the 2000 - 2001 Multimedia Team was to create an educational poster for the Great Dismal Swamp. While creating the poster we had to keep in mind that it would have to attract the attention and aid in the understanding of the swamp for kindergarten through third grade students. This involved using large pictures and simple descriptions for the ideas in the project. The team consulted various elementary teachers seeking input on what attracted students. Elementary textbooks were also used to see how the scholars were using graphics and text to keep their students attention. The reverse side of the poster contains math lessons for the students supplied by the "Math of the Great Dismal Swamp" team.

The Multimedia Team also consulted with environmental researchers to gain a more in-depth knowledge of the swamp itself. Researchers provided us with information ranging from historical to projects now ongoing within the swamp. The benefits, needs, and balance that the swamp provides gave the team more information with which to build the ideas for the poster. Many issues were discussed with the researchers and the team came away with a greater understanding of the diversity within the refuge.

The team gained various software packages used for print, computer, and web development. The instruction varied for each individual depending upon his or her experience in that area of software application. While members may have been familiar with the software, all with the sharing of knowledge gained a better understanding.

Software

Several software packages were incorporated into this project. The software was really what permitted the completion of the project. The software we used included three Macromedia software packages that were Dreamweaver, Flash, and Fireworks. We also used Adobe Photoshop in the actual construction of the poster.

Macromedia Dreamweaver 3

Macromedia Dreamweaver is a software package for developing professional and imaginative Web sites. Macromedia Dreamweaver facilitates workflow by allowing integration with other Web applications and software and builds better web sites at a faster pace.
One special feature of Macromedia Dreamweaver is the template. Templates make it easier and faster for the user to make changes to the overall design of the site by direct revision of the template. Another special feature of the Macromedia Dreamweaver software are the Dreamweaver library items. With use of the libraries the developer can save sections of the HTML code from an existing page for later use.

Also, Macromedia Dreamweaver can be customized using HTML. Users do not necessarily have to know HTML to use Dreamweaver. As a matter of fact, you can use Dreamweaver to learn HTML code. This works because users can design pages in the document window and then view the HTML code that Macromedia Dreamweaver writes in the HTML Source inspector. This is therefore another special feature of Macromedia Dreamweaver.

The Multimedia Team used Macromedia Dreamweaver as our starting in this year's project. The version we used was Dreamweaver 3. We learned the basics of the software and gained insight on elements from the software that we could incorporate into our own webpages. Macromedia Dreamweaver was also useful in helping us build our team page. We used features such as frames, tables, and mouse-overs.

Macromedia Flash 4

Another software package that was integrated into this project was Macromedia Flash. Macromedia Flash is used to design animations, presentations, and Web sites.

One special feature of the Macromedia Flash software is that it can be closely integrated with other Macromedia Web Publishing products, such as Dreamweaver and Fireworks. Flash movies can be incorporated into Dreamweaver documents easily.

The Multimedia Team's web site is an example of incorporating Flash into Dreamweaver. The Team web site illustrates a short movie introducing all of the members to the viewers. The version of the software that we used was Flash 4.

Macromedia Fireworks 3

The Multimedia Team employed one more Macromedia product into the project, Macromedia Fireworks. This software package is used to construct, edit, and add animation to graphics.

The Fireworks software has many valuable features. Even though it was released before the final release of Windows 2000, special testing allows the running of Fireworks 3 on Windows 2000. Another feature of the software is that it can be used with other Macromedia products such as Flash and it can be integrated into the Dreamweaver webpage building software.

Users can launch and edit graphics in Fireworks from Dreamweaver. Macromedia Fireworks is used to create animated GIFs. Generating a sequence of frames that contain different content in each subsequent frame creates them.

The Multimedia Team took advantage of the Fireworks software on our team webpage by using it to create rollovers.

Adobe Photoshop 5.5

The Adobe Photoshop software is a valuable tool for editing pictures and graphics. It is complex and at some times frustrating. Once you learn the various features and understand how they work using Photoshop becomes fun and less complicated.

Some of Photoshop's special features include layers and the History. Knowledge of layers and how they operate is quite useful for getting the hang of Photoshop. Layers allow you to separate one element of a picture from another and work them without disturbing or changing elements of a different layer. Icons on the layers toolbar allow the user to make layers visible or invisible, which comes in handy when working with different images.

The History is another powerful feature of Adobe Photoshop. This feature allows you to go back to any point since the last time you opened Photoshop and undo actions. This allows the user to try many different things and be able to go back and undo any editing they have done.

Photoshop can be used to create posters and all kinds of graphics effects. The software is also quite useful when it comes to editing photographs. One can change the color in the background, delete something from the background or even add someone or something to a photo that was not originally there.

The main task of the Multimedia Team was to create a poster for the Great Dismal Swamp. The Adobe Photoshop software was essential to complete this task. Each team member used the photoshop software to create his or her own unique poster designs. The final poster was created using many different layers and the various editing capabilities of Adobe Photoshop.

System Requirements

Macromedia Dreamweaver 3

Macintosh
Power Macintosh

Mac OS 8.1 or later
32 MB of available RAM
20 MB of available disk space
Color monitor capable of 800x600
resolution
CD-ROM drive

Windows 95/98/NT
Intel Pentium processor or equivalent 120+
MHz
Windows 95/98 or NT version 4.0 or later
32 MB of available RAM
20 MB of available disk space
256-color monitor capable of 800x600
resolution
CD-ROM drive

Adobe Photoshop 5.5

Macintosh
PowerPC based Macintosh computer
Mac OS Software version 7.6 or later

64 MB of RAM
125 MB or available hard-disc space
Large capacity hard disk highly
Recommended.
Color monitor with 256-color (8-bit) or
Greater video card (24-bit color
recommended)
CD-ROM drive
(32-bit TWAIN data source or Adobe
Photoshop compatible plug-in when
using with a scanner)

Windows
Intel Pentium processor or faster
Microsoft Windows 95 or 98, or Windows '
NT 4.0 or later
64 MB of RAM
125 MB of available hard-disc space.
Large capacity hard disk highly
                Recommended.
256-color (8-bit) display adapter (24-bit
color recommended)

CD-ROM drive
(32-bit TWAIN data source or Adobe
Photoshop compatible plug-in when
using with a scanner)

Macromedia Fireworks 3

Macintosh
Power Macintosh Processor (G3 or
higher recommended)
Mac OS 8.6 or 9.X

64 MB of available RAM
800x600, 256-color display (1024 x
768)
80 MB of available hard disk
Adobe Type Manager Version 4 or
later with Type 1 fonts

Windows
Intel Pentium processor (Pentium II
recommended)
Windows 95/98 or NT version 4.0 2000
or later
64 MB of available RAM
800x600, 256-color display (1024x768)

80 MB of available hard disk
Adobe Type Manager Version 4 or later
with Type 1 fonts

Macromedia Flash 4

Macintosh
Power Macintosh with MacOS 8.5 or

32 MB of free available system RAM
40 MB of available disk space
256-color monitor capable of 800x600
resolution
CD-ROM drive

Windows
133 MHz Intel Pentium processor,
Windows 95/98, NT4, 2000 Professional, or
later
32 MB of free available system RAM
40 MB of available disk space
256-color monitor capable of 800x600
resolution
CD-ROM drive

Flash Playback requirements

Macintosh
System 8.1 or later

Netscape plug-in works with Netscape 3
or later

Macromedia Flash Player Java Edition
Requires a Java-enabled browser

Windows
Microsoft Windows 95, 98, Me, NT, 2000
Professional, or later
Netscape plug-in works with Netscape 3 or
or later, and Microsoft Internet Explorer 3.0
or later
Macromedia Flash Player Java Edition
requires a Java-enabled browser

Swamp Facts

History

Nearly 13,000 years ago was when human occupation of the area began. William Drummond, a governor of North Carolina, in 1665 discovered the lake in which now carries his name. In 1728 William Byrd II led a surveying group into the swamp to draw a dividing line between Virginia and North Carolina. In 1763 was when George Washington first visited the swamp and formed the Dismal Swamp Land Company that was involved in draining and logging portions of the swamp (http://hamptoproads.mining.com/citiestowns/southeastus/hamptonroads/library/weekly/aa0427).

Before the Revolutionary War several Virginians and North Carolinians suggested a canal on the eastern edge of the Swamp. This would unite the Albemarle Sound in North Carolina with the Elizabeth River in Virginia. The eastern canal, which parallels route 70 for much of its length was not navigable by small, shallow-draft boats until 1805. In was not until the British blockade during the War of 1812, when the discussion became heated once again for enlarging the canal. In 1815, the successful transportation of flour down the Roanoke River to the Albemarle Sound and up the Canal to Norfolk convinced the business community that the waterway would be important for transporting tobacco and other cash crops from central Virginia to the Tidewater area. Then the canal enlargement project began. Included in it was the Feeder Ditch leading to Lake Drummond, and a system of locks. The canal is still navigable today and is used for boating, but it's commercial importance ended with the construction of a shorter and better canal closer to Norfolk (http://www.vmnh.org/swmpsusn.htm).

Characteristics

The Dismal Swamp is densely forested and contains scattered natural elevations of 10 to 20 feet above sea level. Along the western margin of the Pamlico Formation it rises to 25 feet and more, forming a natural boundary. Even though the swamp has been through much lumbering and widespread destruction of timber because of fire, the area is still heavily wooded with cypress, black gum, juniper and water ash, and a tangle of honeysuckle and woodbine. The swamp is the habitat of many rare birds, which includes the ivory-billed woodpecker. Poisonous snakes are numerous including the cottonmouth. The swamp is known for its fishing and hunting. The deer, bear, raccoon, and opossum are numerous, especially in the nearly inaccessible Coldwater Ditch area (http://www.britannica.com/seo/d/dismal-swamp/).

The Dismal Swamp Canal, built from 1790-1828, is a 22-mi-long north-south intra-coastal waterway uniting the Chesapeake Bay, by the way of Deep Creek and the southern branch of the Elizabeth River, with Albemarle Sound in North Carolina through the Pasquotank River. The canal forms a connection in the Atlantic Intra-coastal Waterway. Located in the middle of the swamp is the freshwater Lake Drummond, which is connected to the canal by the 3-mi-long Feeder Ditch (http://www.britannica.com/seo/d/dismal-swamp).

Past Uses

Proving to be a successful commercial activity of the swamp was logging. Regular logging activities continued as late as 1976, the entire swamp has been logged at least once (http://hamptoproads.mining.com/citiestowns/southeastus/hamptonroads/library/weekly/aa0427).

Current Uses

Activities that you can currently do in swamp include hiking, biking, photography, wildlife observation, fishing, and boating. The fishing and boating activities are permitted year round on Lake Drummond. In the fall is when the white-tailed deer hunt is held. Also available to schools and professional groups are a refuge orientation, film presentations, slide programs, and outdoor classroom activities (http://www.gorp.com/gorp/resource/us_nwr/va_great.htm).

Future Uses

Future uses of the swamp are more harmful to it than the current and past uses. It is this reason why you do not hear about a lot of changes that are going to take place around a swamp. Future uses of the swamp fall directly into the category of development. Lots of swampland is being loss because of population growth in coastal watersheds, dred draining, bulldozing and paving. It is because of these uses that the swamp has been reducing in size (http://www.estuaries.org/loss.html).

The Refuge

The making of a refuge started in 1973 when the Union Camp Corporation donated 49,000 acres of land to The Nature Conservancy. This land was then shown to the Department of the Interior, and the refuge as officially established through The Dismal Swamp Act of 1974. The refuge is made up of almost 107,000 acres of forested wetlands that have been changed tremendously by drainage and continuing logging operations (http://hamptoproads.mining.com/citiestowns/southeastus/hamptonroads/library/weekly/aa0427).

The refuge is inhabited by 29 species of mammals, 38 species of fish, 100 varieties of butterflies, and 3,000 kinds of vegetation. (http://hamptoproads.mining.com/citiestowns/southeastus/hamptonroads/library/weekly/aa0427).

The main function of the refuge's resource management programs is to restore and maintain the natural biological diversity that existed prior to the human-caused alterations. Important to the swamp ecosystem are its water resources, native vegetation communities, and varied wildlife species. Water is being saved and managed by placing water control structures in the ditches. Plant community diversity is being restored and maintained through forest management activities, which simulate the ecological effects of wildfires. Wildlife is managed by insuring the presence of required habitats, with hunting used to balance some wildlife populations with available food supplies (http://www.gorp.com/gorp/resource/us_nwr/va_great.htm).

The Chain of Life

By the swamp being very close to the ocean this creates a unique situation for our area. This causes our area to be an estuary, which is a body of water partly surrounded by land and fresh water from rivers and streams run into it and mixes with the salt water from the ocean. Estuaries are some of the most productive natural systems on earth because of the mixing of nutrients from land and sea. Estuaries can produce more food per acre than some of the more prominent Midwest farmland. Estuaries are important to people because they like it's beauty and for other activities such as fishing, swimming, boating, diving, wildlife viewing, hunting, learning and working. The estuaries provide many different types of habitats, which are important to species of plants, fish, and other wildlife. Estuaries also play a key role in the rates of the commercial fishing industry as well as recreational catch of fish. Estuaries provide lots of jobs for our nation because of fishing, tourism, and recreational boating (http://www.estuaries.org/10facts.html).

Developing The Poster

First things First

Before we began to think and develop some of our ideas for the poster, we began to first consider the main factors that would shape the poster. We knew that only these factors would determine the success of the materials when presented to the audience. The first factor was that this poster would be used by Kindergarten through third grade teachers to teach students in those grades. These students would be the audience in which we would target.

The next factor was that the poster must reflect Kindergarten through third grade level mathematics. This meant that the focal point of the poster had to have some for mathematical relevance and should be easily recognized by the audience. The other factor that was considered had to be focus around the natural landmark of the dismal swamp located in Suffolk and Chesapeake, Virginia.

The swamp it self would be used as the thematic area of the mathematics this would be called mathematics of the dismal swamp. Another group entitled "The Mathematics of the Great Dismal Swamp team" would provide lessons in mathematics surrounding this topic. We were to feed off of some of their ideas to better understand how we would approach the poster.

Consultations
Knowing that our target audience would Kindergarteners through third graders, we decided to consult with certain individuals who were accustomed to the minds of the audience. We consulted with Mrs. Sue Powers, a schoolteacher at Moyock Elementary School. We asked her to describe some things that would appeal to the children in those grades. She gave us great insight and she sparked great opportunities for our mind to develop some ideas and a pathway for ideas to unfold.

We also consulted with Omari Salisbury. Mr. Salisbury is an individual who is well atoned to the dismal swamp. We conversed with him as he told us about some of the things that were happening in the swamp. He talked about some of the animals and some of the plant life that thrived or were endangered that lived in the swamp. We were interested in many facets and aspects of the swamp. We wanted to know its history, its uses, its purpose in the nature, we wanted to know how it was changing, why it was changing, and many other questions, because we knew that the more we knew about the swamp the more ideas we could use in developing the poster. He was a great resource to call upon and to have for referencing the swamp.

Our Trip
After consulting with Mrs. Sue Powers and Mr. Omari Salisbury we decided that to gain a complete feel for the swamp we must plan a trip to visit the swamp and see exactly what goes on there ourselves. The trip took place in the winter. This was a little unpleasant because there was not much life going on there around this time of the year. There was not much foliage or animals in the area at that time due to the climate for that time of the year. The support center for the swamp was very helpful with providing information surrounding the swamp. We were able to get an idea of what happens in the swamp throughout the different months and seasons. We decided to plan another trip to the swamp in the future so that we may see the swamp "in living color."

During that visit we also took along with us two digital cameras to bring the swamp back with us. We took many photos of the swamp as well as some of the sessions that the support center representatives had for the visitors. The pictures were used to see

the environment as a whole while we were back at school. We also used them to bring out some ideas.

Internet Posters

When we finally decided that we were to begin to submit ideas for posters, we decided that the best way to get a feel for a poster was to research types of posters that already exist. So we used the Internet as a medium to search for different types. We found several posters that were pretty fascinating. After finding these posters we analyzed them and tried to see if we could determine exactly how they were created and how they manipulated images and text. After realizing the methods used by the poster designers we decided to use Adobe© Photoshop 5.0© as one of the main tools for developing a poster. We decided to use Photoshop because of the "layers" feature, which makes it a lot easier to place certain graphics and text on the poster.

Some of Our Ideas

We then began to develop some of our own individual ideas. We began to use the many features of Photoshop to see the effects that we could develop. We also began downloading a couple of graphics, mainly pictures of the swamp and some of the animals in it, to place on the poster ideas. Each of the members developed an individual poster to broaden our choices and also to see if we could spawn off new ideas from the posters that we created independently. Trial and error with ideas and assign individual poster projects for each member. Here are a couple of ideas that we came up with:

great dismal swamp or housing development
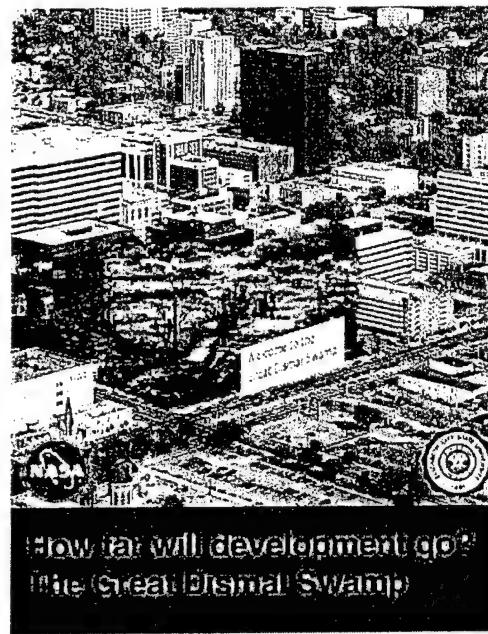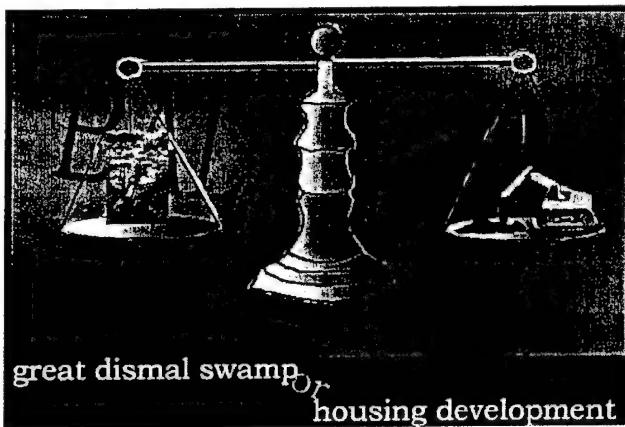
Final Idea

After creating our different posters we decided to find a way to bring the posters into one singular idea. To do this we compared and contrasted with the different posters. We decided upon the things that we did not want and the things that we did want. The main thing that we wanted to focus on was diversity and bringing the diversity together into one main idea and focal point. So we made a sketch of different posters with the unique aspects from the posters that we created on our own to form newer posters. We knew that one of these posters would most likely be the final idea that we would complete this semester.

When we completed sketching the ideas we consulted once more with the Math of the Great Dismal Swamp team as well as Mrs. Sue Powers as we did before to see which one of the posters would best suite the audience's age and attention level. The poster that we felt the most assertive about was the poster that Mrs. Powers chose. After this consultation we began to take the sketch and develop a working product. Through some of the work we talked with various photographers about possibly using some of their

work from the Internet. Some of the photographers wanted monetary awards if we were to use any of their photos. Thankfully we were able to find a photo that we could use.

On the final poster we wanted to bring many facets into consideration. Our first consideration we brought into the poster, as an accent was the life cycle that the swamp plays in the environment. The main cycle we focused on was the estuarine chain that affects everyone from the sea life in the area to the fishermen to the people who eat the seafood caught by the fishermen. The next consideration that we used was mathematics. We applied some mathematical symbols (+, -, /, x) to the poster to accent the subject that would be used as a medium to learn about the swamp. The next thing that we took into consideration was wildlife. We decided upon an animal that we thought best represented the swamp as a whole. We decided upon the Great blue Heron.

With these features we created a final poster in which we are proud to say is a very good one.

Printing the Poster
HP DesignJet 450c
After completing the poster we decided to use the Hewlett Packard DesignJet 450c printer.

This is what we first used to print out our poster design onto poster paper. Using this printer we began to print out the poster. Disappointingly we began to notice that the printer wasn't printing the poster the way that we wanted. We began to run some trial and error tests on the printer to see if it would be able to print out our final copy of the poster. We were not satisfied with the product that the printer wrought. So because of this we opted to use another printer.

Epson Stylus Color 3000
The next printer that we used was the Epson Stylus Color 3000.
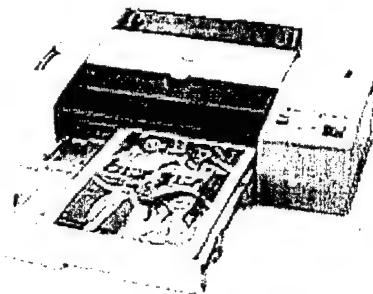
When we first connected the printer to the computer that we used we waited to see if the computer had a print driver that would recognize the printer. We discovered that it did not so we decided to download one from a site that we searched on the web and found. Finally the computer was able to read the printer and so due to this we were able to began testing and printing out copies of our poster.

This printer was very reliable in bringing about a final printed product. The resolution of the printout met our desired effect. We were glad to have decided upon using this printer. We ended up printing out our final product.

Final Result

Below is a proportional sized view of our final design.
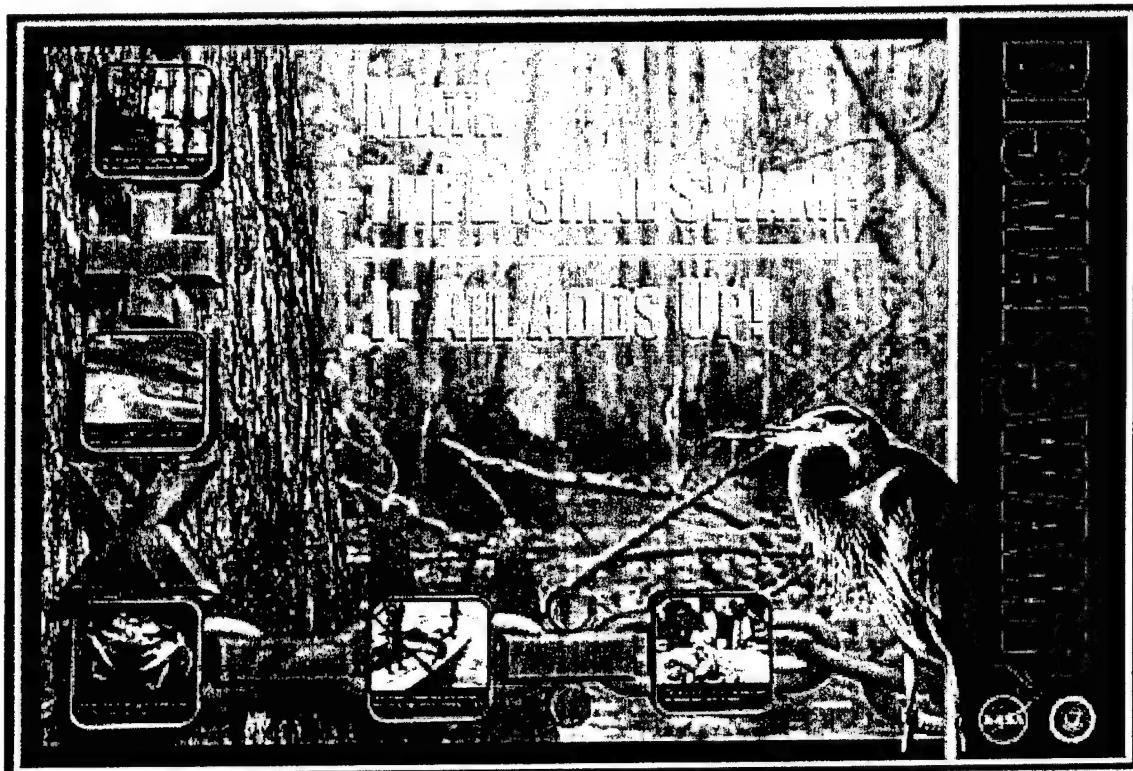
Resources and Related Websites

http://www.tidewateradventures.com/dismal.htm, developed by Tidewater Adventures

http://www.ecsu.edu/ECSU/AcadDept/Geology/dismal_swamp.htm, developed by ECSU Geology Department

http://www.albemarle-nc.com/camden/history/canal.htm, developed by ICW-NET

http://www.vmnh.org/swmpsusn.htm, developed by Susan B. Felker

http://members.inteliport.net/%7Eaea/, developed by Albemarle Environmental Association

http://ww.epa.gov/owow/wetlands/restore/, developed by the Environmental Protection Agency (EPA)

http://www.pilotonline.com/special/dismal/, developed by Pilot Online

http://www.sws.org/, developed by Society of Wetland Scientist

http://www.epa.gov/OWOW/wetlands/vital/toc.html, developed by Environmental Protection Agency (EPA)

http://h2osparc.wq.ncsu.edu/info/wetlands/, developed by North Carolina State University (NCSU)

http://www.taxodium.env.duke.edu/wetland/, Duke University

http://h2o.enr.state.nc.us/wrp/index.htm, NCWRP

http://www.nwi.fwx.gov/, United States Fish and Wildlife Service

http://www.estuaries.org/, Restore America's Estuaries (RAE)

http://www.nccoast.org/, North Carolina Coastal Federation

http://nwf.org/wetlands/, National Wildlife Federation

http://www.audubon.org/campaign/wetland/index.html, National Audubon Society

http://www.ecsu.edu/, Elizabeth City State University

Software and Equipment

http://www.macromedia.com/, Macromedia

http://www.virtual-fx.net/, Flash Tutorials

http://sleepydesign.tripod.com/, Dreamweaver Tutorials

http://www.adobe.com/products/tips/photoshop.html, Adobe Photoshop Tutorials

http://www.genesis-technologies.com/macromediaweb.asp, Macromedia Web Development Tools

http://www.adobe.com:82/products/photoshop/, Adobe Photoshop 6.0

http://www.macromedia.com/software/fireworks/, Macromedia Fireworks 4

http://www.meridiancyber.com/products/output/epson/epson300.htm, Epson Stylus 3000 Color Printer

http://prographics.epson.com/products/stycolor3000/, Epson Stylus 3000 Color Printer

August 2000
School of Mathematics, Science
and Technology Visiting Lecture

Dr. Earl R. Barnes
"Some Combinatorial
Optimization Problems"

(left-to-right) Drs. V. Manglik, D.Sengupta, G. Lawrence, H. Pendarkar, J. Houston, C. Mahoney, E. Barnes (GaTech), V. Raskin, L. Hayden, H. Ellingsen, and K. Kulkarnie. Dr. Houston serves as coordinator of the visiting lecture series.

INTERNSHIP ROUNDTABLE

NOV. 9, 2000

Internship Information was provided by Ms. Sandra Gibson, ECSU Placement Office, Dr. Georgia Lawrence, Chair Math and CS, Mr. William Barker, Airway Science Professor, and Dr. Linda Hayden, ONR Principal Investigator. Student who discussed summer 2000 internships included Ernest Walker, Shayla Brooks, Issac Lister, Katrina Banks, Golar Newby, Keisha Harrison, Torreon Creekmore, Melvin Mattocks, Joseph Gale and Vincent Davis.

SOARS Conference   December 1, 2000   Hosted by: Winston-Salem State University

Background:Seven public universities (North Carolina A&T State University, North Carolina Central University, Elizabeth City State University, Fayetteville State University, Winston-Salem State University, The University of North Carolina at Pembroke, and The University of North Carolina at Asheville) formed a consortium to advance the undergraduate research enterprise at each university and throughout the state. Each year the North Carolina Consortium for Undergraduate Research (NCCUR) has sponsored a fall undergraduate research conference with the theme "Seizing Opportunities for Advancing Research Scholars" (SOARS). Research presentations are made by undergraduate students in a wide variety of disciplines. Representing ECSU at SOARS 2000 were Shawneque Reid, Cedric Booth, Patrice Turner, Ramatoulie Bah, Carl Seward, Elizabeth Rascoe, Golar Newby, and Dr. Bobbie Lewis. Dr. Juliette Bell (FSU) was the plenary speaker.
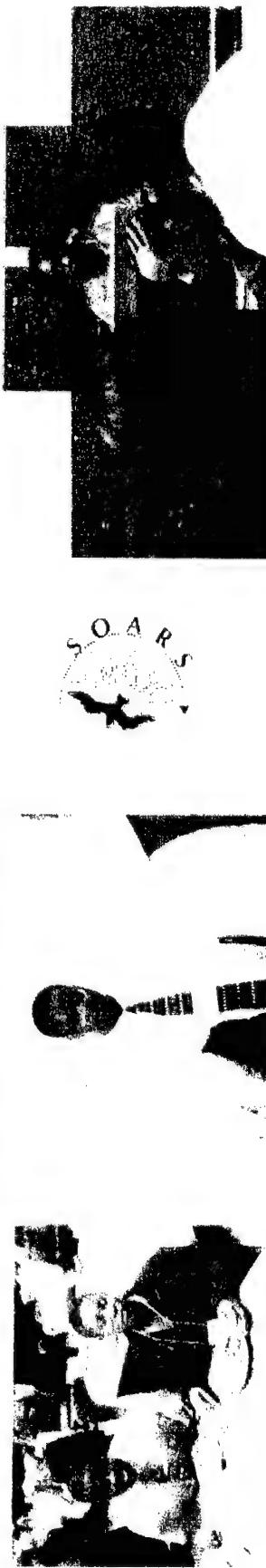
Objectives: To enhance the undergraduate research infrastructure in North Carolina Universities by coordinating undergraduate research activities and resources, and assisting in the development of comprehensive undergraduate research strategies for mentors and students.

The mission of the National Conference on Undergraduate Research (NCUR) is to promote undergraduate research scholarship and creative activity done in partnership with faculty or other mentors as a vital component of higher education....

ABSTRACT BY ELIZABETH CURTIS AND LAJOYCE H. DEBRO ASSOCIATION OF GENE SEQUENCES WITH INCLUSION PROTEINS OF BACILLUS THURINGIENSIS SUBSPECIES FINITIMUS

Bacillus thuringiensis subspecies finitimus is unique among insecticidal strains of bacteria. The bacterium produces at least two crystalline parasporal inclusions. One inclusion is released in the environment separately from the spore and the second atypical inclusion remains with the spore inside a common envelope, the exosporium. Two genes, cry26 and cry28, have been cloned from this strain but neither of the genes has been specifically associated with the enclosed or the free inclusion proteins. The objective of this study was to use PCR to correlate the cloned cry genes with specific inclusion proteins of B. thuringiensis subsp. finitimus and plasmid variants of subspecies finitimus that produce or fail to produce enclosed inclusions. PCR primers were designed from the published sequences of cry26 and cry28. PCR results show that both genes correlate with a large 98-mDa plasmid but alone is not sufficient to direct the formation of an enclosed inclusion. The free inclusion is unrelated to cry26 or cry28.

Dr. LaJoyce Debro , Professor of Biology and Elizabeth Curtis Department of Biology, Jacksonville State Univ.

13th Annual National
Black Graduate Student Conference

Texas Tech University March 28 - April 1, 2001

Dr. Cheryl Lewis, McNair Program Director, attended the conference with student representatives of the ECSU Ronald McNair Program. Abstracts from the McNair student presentations follow below.

Keisha Harrison, ONR Scholar, Elizabeth City State University
"Innovative Visualization of Geospatial Data for Transportation Engineering Applications"

The problem of determining an optimal site for a truck and weight enforcement facility along an interstate highway interested a collaborative effort by the Wisconsin Department of Transportation (DOT), KL Engineering and the University of Wisconsin Environmental Remote Sensing Center (ERSC). The study is for site location was located along the I-90 corridor between the Illinois/Wisconsin border and Madison, Wisconsin. The project goal was to pilot innovation in geospatial visualization technology for comparing possible sites for a truck safety and weight enforcement facility. Visualization technology enabled the presentation of spatial information reflecting complex engineering, environmental, transportation and design issues in ways that were clear and understandable to DOT and public stakeholders. EOS-era Landsat-7 satellite data was integrated and synthesized with digital elevation models (DEMs), aerial photography, and other geospatial data to represent current terrain and land cover. Visualization technology and "fly-through" simulations created with ERDAS Imagine software and made accessible through movie files displayed this information at public hearings in forms that were meaningful to general audiences. The NASA-sponsored program for the commercialization of remote sensing Affiliated Research Center (ARC) at UW-Madison provided the suport and resources for piloting this geospatial visualization technology.

ONR Graduate Success Award Lecture April 5, 2001
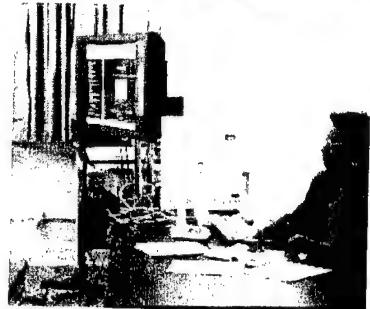
Shown is Dawne Brown, graduate student in engineering at Old Dominion University. Her advise to students is given below.

Graduate School Application Process

* Apply early.
* Take GRE
* Develop relationships with instructors while in undergraduate school who will be willing to write you recommendations for graduate school.
* Secure funding: For the Applied Sciences, there is endless funding available either through the university you plan to attend or through fellowships, scholarships, grants, etc.

Graduate School Environment

* Expectation: Students are expected to have firm understanding of major courses. instructors do not reteach information.

* Independence: Students should be capable of studying and learning difficult concepts independently of other students. At this level, you should always be asking the questions "How?" and "Why?", and be able to answer them.

Undergraduate Preparation

* Study, study, study!!!
* Develop independent study skills.

* Secure internships/co-ops.
* Learn to read with understanding.

Fall 2000
Undergraduate Research Training

Nurturing ECSU Research Talent Program (NERT)
http://nia.ecsu.edu/onr/onr.html

OFFICE OF NAVAL RESEARCH
ONR

NSTA
Eastern
Area
Conference

Baltimore, MD
Nov. 16-18, 2000

Dr. Ben Carson, MD
Keynote Speaker

Attending the NSTA Conference were Kenyatta Lee, Carl Seward, Linda Hayden, Joal and Wanda Hathaway.

Elizabeth City State University

ELIZABETH CITY, NORTH CAROLINA

MICKEY L. BURNIM, CHANCELLOR

Honors Convocation

Thursday, April 19, 2001
2:00 o'clock in the afternoon
Fine Arts Complex Auditorium

Honors Convocation Program

PRELUDE No. 1.................................... *"The Well-Tempered Clavier"* ....Johann S. Bach
Dr. Gloria J. Knight, *Pianist*

PROGRAM
Dr. Albert L. Walker, *Vice Chancellor for Academic Affairs*
- Presiding -

INVOCATION ....The Reverend Roosevelt Askew
University Counselor

MUSICAL SELECTION .... *"He's Got the Whole World in His Hand"*...............................arr. Keith Hampton
The University Choir
Mr. Billy Hines, *Conductor*
Constance Fleming, *Soprano*

INTRODUCTION OF SPEAKER ....Mr. Gamaliel Cherry
Junior, Honors Program

ADDRESS...Dr. Leon Rouson
Director, ECSU Mathematics & Science Education Network

PRESENTATION OF AWARDS...Dr. Margery Coulson-Clark
Assistant Vice Chancellor for Academic Affairs

Dr. Carol Calloway Jones
Director, Honors Program

Miss Kymber Taylor
Sophomore, Honors Program

CONGRATULATIONS ....Dr. Mickey L. Burnim
Chancellor

ANNOUNCEMENTS...Miss Rhonda Holmes
Sophomore, Honors Program

POSTLUDE ....Solemn Processional *"Air from Water Music Suite"* ....George F. Handel
Dr. Gloria J. Knight, *Pianist*

Special Honors
CHANCELLOR'S DISTINGUISHED EMBLEM AWARDS
Scholars' Blazers

James Cooper   Joshua Henson
Carrie Finney   Clarice Johnson
                        Wendilyn Pierce

Recipients of Awards
THE HONORS PROGRAM
Certificates of Merit

Branden Anderson	Carinthia Cherry	Joshua Henson	Tiffany Meads	Donna Richards	Keisha Stephenson
Bernard Bailey, Jr.	Gamaliel Cherry	Bonnie Higgins	Amy Morgan	Keith Richardson	Kymber Taylor
Jessica Barrier	Natasha Coley	Rhonda Holmes	Jeanette Morris	Samantha Royster-Cunningham	Laysha Taylor
Colina Bartlett	Kizzy Crawford	Clarice Johnson	Golar Newby	Edwin Roussea	Tracy Taylor
Kimberly Bond	Norma DeVita	Tracie Johnson	Adriane Patterson	Chaka Ruffin	Tia Thorne
Tameka Braswell	Joseph Ferraro	Arnold Jones	Tierra Porter	Jenny Scott	Albert Walker, III
Tamarah Bridges	Crystal Foust	Pamela Jones	Jessica Prayer	Tiffany Shearn	Delia Wiggins
Shayla Brooks	Sharon Gorgani	Billie Malatesta	Jeaime Powell	Beshelya Smith	Pierre Wood
Gregory Burgess	Scott Hammond	Madana Marshall	Mia Price	Zenika Spence	
Tyrell Carr	Victoria Harrison	Melvin Mattocks	Elizabeth Rascoe	RaShawn Spencer	

HONORS PROGRAM DARIN L. COLE AWARD ....Gamaliel Cherry
Beshelya Smith, Pierre Wood

GREEK HONORS CUP ....Delta Theta Chapter
Alpha Kappa Alpha Sorority, Inc.

ART
Academic/Artist Achievement Award..Rhonda Holmes

BIOLOGY
Clarence E. Biggs Award ....Clarice Johnson
Curtis D. Turnage Award ....Leeka Sock
Herman G. Cooke Research Excellence Award..Tyrell Carr
Certificate of Merit - Freshman ....Vivian McDaniels
Certificate of Merit - Sophomore ....Patrice Boyce
Evans-Patterson Science Award...Clarice Johnson

BUSINESS AND ECONOMICS
Outstanding Graduating Senior Award..April Clark
Gateway Bank/Richard Whiting Outstanding Student Award...Crystal Foust
Gateway Bank/Richard Whiting Most Improved Student Award ....Devine Overton
Outstanding Business Administration Student Award...Chimur Knight
Outstanding Accounting Major Award...Natalie Moore

EDUCATION AND PSYCHOLOGY
Charles A. Bryant Senior Scholarship ....Adriane Patterson
Lois W. Green Graduating Senior Award in Teacher Education...Adriane Patterson
Psychology Program Award ....Kenya Bethea, Kimberly Carter
Athena Chastean, Loretta Lane, Kimberly Shearin
Kendra Smith, Pierre Wood

EDUCATIONAL TALENT SEARCH
McNair Scholars Eagle Award...Kenya Bethea, Sheanna Bonner
Kimberly Carter, Keisha Harrison
Garrick Scott, Samantha Royster-Cunningham
McNair Scholars Challenger Award..Waquita Lane
McNair Scholars Excellence Without Excuse Award...Clarice Johnson

GENERAL STUDIES
Division of General Studies Award..Audrey Moore

GEOLOGICAL, MARINE AND ENVIRONMENTAL SCIENCES
Award for Academic Excellence in Marine Environmental Science..Patty Rennert, Cleantha Samuel
Geology Academic Excellence Award ....Sharon Goehring
David Swinney, Jessica Yelverton

INCENTIVE SCHOLARSHIP PROGRAM
Outstanding Freshman Incentive Scholar..DeTra Stith
Outstanding Sophomore Incentive Scholar ....Amy Morgan
Outstanding Junior Incentive Scholar..Sherri Horner
Outstanding Senior Incentive Scholar ....Connie Ashley

LANGUAGE, LITERATURE & COMMUNICATION
Graduating Senior Award..Michael Fournier
E. M. Spellman Award..Shaunté Barnes

MATHEMATICS & COMPUTER SCIENCE
The J. L. Houston Mathematical Science Award..Chaka Ruffin
The Umfort E. Locus Computer Science Award..Golar Newby
ONR-Nurturing ECSU Research Talent Award of Excellence ....Joseph Gale
Keisha Harrison
ONR Nurturing ECSU Research Talent Program Award ....Bernard Bailey, Katrina Banks
Shayla Brooks, Torreon Creekmore, Willie Gilchrist, II
Paula Harrell, Casey Keyes, Melvin Mattocks
Shawneque Reid, Carl Seward, Eunice Smith
Patrice Turner, Nelson Veale, Andrew Vinson
Office of Naval Research Scholars Award...Ramatoulie Bah, Vincent Davis
Joseph Gale, Keisha Harrison, Golar Newby, Ernest Walker

MILITARY SCIENCE
Top Scholastic Award ....Casey Keyes

MUSIC
Music Department Award..Jade Hughes
National Association of Music Business Industry Award ....Jade Hughes
Woodwind Award ....Shantee Wilkins
Theory Award..Shantee Wilkins

PHYSICAL SCIENCES
Certificate of Academic Excellence ....Ramatoulie Bah
Joseph Batts, Carinthia Cherry,
Torreon Creekmore, Vincent Davis, Shameika Vick
Project ATOM - Excellence in Chemistry Award..Joseph Batts
Project ATOM - Physics Award..Ramatoulie Bah
Torreon Creekmore, Vincent Davis, Valenta Wade

SOCIAL SCIENCES
The Department of Social Sciences Award ....Trenette Clark
Timothy H. Wamack Scholarship ....Mary Pollard

STUDENT AFFAIRS DIVISION
Davis Cup ....Complex Residence Hall
Accepting - Clarice Johnson, DeTra Stith
Honda Campus All-Star Challenge Team..Warren Gibbs, Joshua Henson
Deanna Morring, Shannon Penn, Chaka Ruffin
Commuter Student-of-the-Year..Gail Harris

STUDENT SUPPORT SERVICES AWARD ....Tina Noriega

TECHNOLOGY
Technology Education Faculty Award..James Fox
Industrial Technology Faculty Award - Sophmore...Steven Gordin
Industrial Technology Faculty Award - 2nd Highest GPA (Senior)..Tuan Van On
Industrial Technology Faculty Award - Highest GPA (Senior) ....Joseph Tillett

CLUBS AND ORGANIZATIONAL AWARDS

The Alpha Kappa Alpha Sorority Scholarship
    Delta Theta Chapter ....Bernard Bailey

The Alpha Kappa Alpha Sorority Scholarship
    Zelta Kappa Omega Chapter...Risha Stallings

The Delta Sigma Theta Sorority Scholarship
    Elizabeth City Alumnae Chapter...Sherri Horner

Class of 1967 Scholarship Award..Justin Anderson
                                                                 Carl Seward

Kappa Delta Pi Counselor's Award...Carol Pressnell

WHO'S WHO

Rayshawn Askew	Kizzy Crawford	Tracy Taylor
Shaunté Barnes	Gwenette Dixon	Albert Walker, III
Linda Barrett	Sherri Horner	Cynthia Watts
Stephanie Beaman	Travious Johnson	Lashindra Webb
Crystal Bloomfield	Melvin Mattocks	Aretha Williams
Kathryn Burgess	Barbara McDermott	Pierre Wood
Kimberly Carter	Kitty Pressnell	
Gamaliel Cherry	Chrishanda Rodgers	
Trenett Clark	Risha Stallings	

Chancellor's Distinguished Emblem Award
Spring Semester 1999-2000

Pamela Gae Adams
Shamaina Ty'Kiea Allen
Branden G. Anderson
Connie Lane Ashley
Vivian Alberta Baars
Ramatoulie Bah
Kenshesa Lopez Barnette
Stephanie Guttu Beaman
Annika Neshele Billups
Crystal D. Bloomfield
Kimberly Wannette Bond
Latonya M. Bond
Rodshawn Lamont Branch
Tameka Roshelle Braswell
Karen Lee Briggs
Naiyhani C. Broughton
Tinika Lyvette Bunch
Kari Bass Chappell

Natasha Shenee' Coley
James S. Cooper
Audrey Shovone Dance
Christy Dawn Davenport
Vincent Augustus Davis
Carrie L. Finney
Theodore Paul Finney
Michael A. Flanigan
Crystal R. Foust
Katrina Yvette Godwin
Nicole Marie Gray
Bethaney Linn Hague
Carrie Lynnford Harrington
Keisha L. Harris
Teneshia Danielle Harris
Joshua Frederick Henson
Bettina Shaunee Holloman
Sherri Genese Horner

Ferrial Tyon James
Clarice Ruth Johnson
Alicia Michelle Jones
Tiffany Lynne Jones
Tyrone Jones
Daniel L. Jordan
Sheri D. Joyner
Christy Davina Lewis
Benjamin L. Long
Billie Jo Anne Malatesta
Katrina E. Maltba
Menervia Lizetta Mangum
Allison Hughes Mims
Amy Old Morgan
Tamisha Sha'Ron Murphy
Nicole Forehand Overton
Kendra Lyvette Parker
Wendilyn Price Pierce

Tierra Monique Porter
Susan Ellen Roberts
Crystal Deon Simpson
Amity N. Sledge
Beshelya D. Smith
Kacey Lynn Smith
Ebony Latoria Sneed
Sherenia Nicole Solomon
Zenika Shenell Spence
Elizabeth Suderman
Tracy A. Taylor
Vernecia Von Townes
Jeanette Watson
Justin Ray Winslow
Colin Reid Woodley
Chaquella S. Worthington

Chancellor's Distinguished Emblem Award
Fall Semester 2000-2001

Catina Renee Alston
Branden G. Anderson
Rebecca Dawn Armstrong
Connie Lane Ashley
Rayshawn Lamar Askew
Shannon D. Autry
Amena G. Becton
Susanne Denise Blevins
Crystal D. Bloomfield
Kimberly Wannette Bond
Melvin Jevon Bonner
Kathryn M. Bottum
Tonya Brinkley
Tremaine Caldwell
Shamika L. Cash
Kari Bass Chappell
Gamaliel R. Cherry
Trenette Tyrell Clark
Natasha Shenee' Coley
James S. Cooper

Audrey Shovone Dance
Royelle Edwarda Davis
Vincent Augustus Davis
Norma Jean DeVita
Gwenette Nicole Dixon
Phebe Antoinette Eley
Carrie L. Finney
Theodore Paul Finney
Crystal R. Foust
Demetra J. Gilmore
Valerie Goodwin
Sharon Gorgani
Javon Griffin
Patty Twiford Halstead
Paula Rene Harrell
Kristel L. Hedgepeth
Joshua Frederick Henson
Sherri Genese Horner
Leverne Jackson
Clarice Ruth Johnson

Susan Marie Jones
Tiffany Lynne Jones
Monique Shnee' Joyner
Nicole D. Kaczmarek
Angela Marie Kurtzweil
Waquita Nicole Lane
Damian O'Neil Lewis
Benjamin L. Long
Casey Maderazo
Billie Jo Anne Malatesta
Heather A. Malone
Vivian J. McDaniels
Mellisa D. McLean
Leslie Michelle McPherson
Joy Lucinda McGhee
Carrie Elizabeth Miller
Angela Jeanette Mitchell
Amy Old Morgan
Sheree LaMone Moye
Tina M. Noriega

Nicole Forehand Overton
Crystal Dianne Owens
Jesseca E. Paige
Adriane Daniell Patterson
Wendilyn Price Pierce
Tierra Monique Porter
Neils Francisco Ribeiro
Sabrina Kimberly Robinson
Cleantha D. Samuel
Carl William Seward
Eunice D. Smith
Tisa Sheree Stiles
DeTra L. Stith
Tia Nicole Thorne
Monica Jane Vrabic
Albert Roscoe Walker, III
Rebecca Lynne Walker
Mikel Colette Womack

Honors Spring Semester 1999-2000

Chancellor's List: 3.75 to 4.0 Average

Pamela Gae Adams
Jeffinfer Lyn Adkins
Shamaina Ty'Klea Allen
Branden Germaine Anderson
Connie Lane Ashley
Vivian Alberta Baars
Ramatoulie Bah
Kim B. Ballance
Kenshesa Lopez Barnette
Charles Henry Basnight, Jr.
Stephanie Guttu Beaman
Barbara Joan Beck
Annika Neshele Billups
Crystal Del'Borah Bloomfield
Pamela A. Bodley
Kimberly Wannette Bond
Latonya M. Bond
Bonita Dephne Booze
Andrew Kiddoo Bowman
Trinette Gibbs Bowser
Rodshawn Lamont Branch
Tameka Roshelle Braswell
Karen Lee Briggs
Rhonda Jean Britton
Naiyhani Cherice Broughton
Deborah Comer Bunch
Tinika Lyvette Bunch
Ruth Ann Burgess

Malissa Dianne Carr
Sandra Marie Cashwell
Karl Bass Chappell
Carolyn Hudson Cherone
April Denise Clark
Natasha Shenee' Coley
James S. Cooper
Cynthia Askew Croswait
Audrey Shovone Dance
Richard Scott Darling
Christy Dawn Davenport
Tammy Lynn Davenport
Kathleen Delaney Davis
Vincent Augustus Davis
Melvin Douglas Dawson
Alisa Ann Esposito
Dixie Blanche Estus
Sallie Elizabeth Farrar
Alfred Ray Ferguson
Carrie L. Finney
Theodore Paul Finney
Michael A. Flanigan
Joan Eileen Fonville
Sarah Burgin Foster
Michael D. Fournier
Crystal R. Foust
Tracey Colson Godfrey
Katrina Yvette Godwin

Sharon L. Goehring
Nicole Marie Gray
Mary C. Griffin
Eric D. Grunwald
Bethaney Linn Hague
Carrie Lynnford Harrington
Keisha L. Harris
Teneshia Danielle Harris
Amber Michelle Hassell
Grantina A. Hayes
Joshua Frederick Henson
Barbara Divene Hines
Marcla Perry Hobbs
Bettina Shaunee Holloman
Curtis Edward Horne
Sherri Genese Horner
Cynthia E. Howington
Benita Earl Hurley
Eldon E. Jackson
Ferrial Tyon James
Clarice Ruth Johnson
Alicia Michelle Jones
Tiffany Lynne Jones
Tyrone Jones
Daniel L. Jordan
Sheri D. Joyner
Ravinder P. Kaur
Barbara J. King

Chimur Santana Knight
William E. Krimmel, III
Joseph Kurtzwell
Barbara K. Lamb
Tracy Anne Lane
Nicole Marie Lavinder
Jacob Colin Leonard
Rebecca Lynn Leonard
Christy Davina Lewis
Maureen C. Liverman
Benjamin L. Long
Billie Jo Anne Malatesta
Katrina E. Maltba
Menervia Lizetta Mangum
Barbara Dale McDermott
Ingrid McEntire
Jennifer L. McGire-Robb
Carly Brothers Meads
Holly Barkwell Meads
Heather M. Midgett
Amyjo Marie Miller
Stephanie Margaret Miller
Allison Hughes Mims
Amy Old Morgan
Tamisha Sha'Ron Murphy
Kimberly A. Newbern
April Swift Nizami
Warren Alfred Oliver

Thanh Van On
Nicole Forehand Overton
Selena E. Overton
Kendra Lyvette Parker
Richard F. Petersen
Wendilyn Price Pierce
Tara Deleight Pleasant
Anthony Poole
Tierra Monique Porter
Carol A. Pressnell
Sharon Lee Priest
Anne Michelle Raymond
Kimberlie Lynne Riddick
Susan Ellen Roberts
Melanie Dawn Rockwell
Tabitha Fawn Romano
Keya Joneice Ruston
Shirley Wynne Schoolfield
Heidi M. Schultz
Robin D. Sciabica
Samuel L. Shrader
Janice Simmons
Crystal Deon Simpson
Sachwinder P. Singh
Julianne Hinson Sizemore
Amity N. Sledge
Beshelya D. Smith
Debra Gregory Smith

Kacey Lynn Smith
Ebony Latoria Sneed
Sherenia Nicole Solomon
Zenika Shenell Spence
Cynthia Diane Spencer
Latonya Ann Square
Roxanne P. Stewart
Donna M. Stockli
Kendra L. Stone
Joan Harrell Taylor
Robin Lane Taylor
Tracy A. Taylor
Dawn Woodroof Tillett
Vernecia Von Townes
Jeanette Watson
Lena A. Whitfield
Wendy L. Whitley
Angela J. Wilder-Jackson
Penda R. Wilkins
Justine Ray Winslow
Anita Lynn Wogoman
Colin Reid Woodley
Chaquella S. Worthington
Mary Christine Young

Vice-Chancellor's List: 3.50 to 3.74 Average

Rocky L. Allen
Patrick Israel Anding
Tonya Christine Aponte
Tanya Marie Arellano
Rayshawn Lamar Askew
Bernard Wesley Bailey, Jr.
Shaunte Laquita Barnes
Jessica Ann Barrier
Antonio Dewayne Barrow
Tantanisha Lalita Baskerville
Shanique Lynette Beale
Yong Hui Beck
Angela Reversal Betts
Davida Nikki Bines
Susanne Denise Blevins
Winter Suzanne Bobko
Milton Thomas Bond
Sheanna L. Bonner
Patrice Markeita Boyce
Stacy Brock

Cartrell K. Brown
Julian Brown
Kathryn Dall Burgess
Laraaeshontee A. Butcher
Stephanie Ann Carpenter
Abrian Cherwanda Carter
Donald Dwight Charity, Jr.
Gamaliel R. Cherry
Alice Brewin Cox
Kizzy Victoria Crawford
Michelle Marie Gullipher
Norma Jean DeVita
Carla Crystal Eason
Harriett D. Evans
Joseph Lincoln Ferraro
Philip Q. Foreman
Christa L. Gallop
Gregory Jason Gilbert
Valerie Goodwin
Kimberly Green

Edward Hall, Jr.
Scott Michael Hammond
Shavonne Lanelle Harcum
Wynet Vernesla Harrell
Gail Mercer Harris
Holly Renee Harris
John Richard Hinkle
Jacqueline Denise Holloman
Rhonda Lolita Holmes
Teresa Lenora James
Joya Naticia Jenkins
Tracie LaWanda Johnson
Kevin Hosea Jones
Nina Shearon Jones
Pamela Rene' Jones
Shari Yvonne Jones
Susan Marie Jones
Quinton Montrez Joyner
Katina Genae' Khan-Anthony
Susan Virginia Klyver

Waquita Nicole Lane
Rodney D. Lyons
Rebecca A. Maestas
Melvin Lee Mattocks
Kenneth Allen Mays
Charmaine Lavonn Melson
Angela Jeanette Mitchell
Shayvonna Mizelle
Delishia R. Moore
Cynthia Marie Morris
Tonisha Hinton Mozelle
William Baker Nelson, Jr.
Natarsha Vonshel Nixon
Tuan Van On
Inger Leverdia Parker
Pamela Anne Parnell
Adriane Danielle Patterson
William Whitman Peele, III
Woodrow Perry
Brain K. Phelps

Tracy Benton Port
Elizabeth T. Rascoe
Neils Francisco Ribeiro
Keith O'Brian Richardson
Kristen Denise Riddick
Shanita D. Riddick
Tracie Lee Riddick
Trisha Bunch Sawyer
Tiffany K. Shearn
Cynthia Ann Simpson
Regina Elizabeth Simpson
Owen T. Stevens
Kymber Lee Taylor
Avis Michele Thompson
Tia Nicole Thorne
Monica Valentine
Lennette Perry Ventura
Paulette Myers Wagner
Albert Roscoe Walker, III
Nicole Lynette Walker

Lisa Chiao-Ling Wang
Teresa Blanchard Ward
Cynthia Sue Watts
Nicole Keefe White
Lavonda Nicole Whitt
Dawn Nichole Williams
Frederick L. Williams
Mikel Colette Womack
Tarneshia Lashay Womack
Pierre Jovan Wood
Peter R. Woolridge
Christine P. Wright

Honor List: 3.00 to 3.49 Average

Ricky B. Adams
April D. Allen
Joyce Lashun Allen
Justin Edward Anderson
Latosha L. Andrews
Cynthia Michelle Arendts
Battina Doreen Armstrong
Pamela Marie Armstrong
Laura Boone Ausby
katrisha Laurel Barner
Shelly Marie Barrack
Linda D. Barrett
Colina N. Bartlett
Joseph Boyd Batts
Shawn O'Nell Beasley
Cynthia Patrice Bell
Antonio Devon Bess
Jeffery A. Billups
Carroll Biondi
Conell Stallings Blount
Linda Ann Bond
Melanie Lorraine Boone
Larry Jefthro Boston
Trisha Gail Breeding
Tamarah Michea' Bridges
Kevin Lee Briggs
Nicholas Thornton Britt
Demetria Y. Brooks
Shayla R. Brooks
Tracy M. Brooks, Jr.
Desmond Earl Brown
Gregory Christopher Burgess
Erica Delvern Burnell
Keith Lamont Burton
Beth Anne Carpenter
Latanya M. Carr
Tyrell Carr
Derrick Codon Carter
Kimberly Michelle Carter
Karen Melissa Carver
William Harvey Chappell
Catreina Dinnete Cherry
Roy Carlton Cherry, Jr.
Cynthia Michele Christian
Pamela Denise Clanton
Trenette Tyrell Clark
Lemuel Cobb, Jr.

Elroy Cofield
Monica Lukeisha Cofield
Renesha Devon Collier
Crystal Joye Cooper
Yvonneda Nicole Cowell
Torreon Navon Creekmore
Brian Davis Crump
Nigel Demond Daniels
Rebecca Ann David
Kindred Dwayne Davis
Royelle Edwarda Davis
Uyless M. Dewberry, Jr.
Destiny M. Dickerson
Annette Marie Dixon
Derrick Dixon
Gwenette Nicole Dixon
Carledia V. Dozier
Chris Allen Dunn
Kimberly Earley
Lekisha Tramaine Easter
Kimberly T. Edwards
Michael Blaise Edwards
Peter Madison Eley
Phebe Antoinette Eley
Shanae La'nette Elliott
Natasha S. Ellis
Alicia Kim Evans
Devona M. Faison
Kimberly Marie Farless
Stephanie Fenner
Keisha Yvonne Ferguson
Jennifer Leigh Ferrell
Leann K. Ferrell
Candace Monique Fisher
Latasha M. Flood
Michael Justin Forbes
Sherrie Wadtrese Forrest
Latisha M. Freeman
Takisha Lamen Frost
Janelle Aline Gale
Joseph Andrew Gale
Gregory Lewis Garner
Angela Gibbs
Felicia L. Gibson
George K. Gordon
Omar Ulysses Gordon
Sharon Gorgani

Benjamin C. Gray, Jr.
Fitema Arnea Gregory
Marilyn Gregory
Javon Griffin
Emma Lee Hall
Kimberly A. Hall
Takeyla N. Hall
Richard D. Halstead
Leeanna Rene Hamon
Vanetta J. Hanshaw
Anthony Demone' Harding
Keisha Lashaun Harrison
Amy Morgan Hassell
Angela Hathaway
Bryan Alan Hawkins
Candice E. Hedgepeth
Bonnie Nicole Higgins
Melody Degina High
Donna Jean Highsmith
Mary L. Hill
Tiffany Renee Hopson
Jade J. Hughes
Christian Ewell Hutchinson
Leverne Jackson
Marlo Concepcion Jackson
Marcia Sutton James
Sholonda Tawana James
Weldon Thomas James
Venita Francine Jenkins
Kamicia Chauntel Johnson
Latisha R. Johnson
Monica Latoya Johnson
Travious LaQuanda Johnson
Charles R. Jolley, Jr.
Arnold L. Jones
Brian Anthony Jones
Erik Dyon Jones
Jwisha Juanita Jones
Valerie Renee Knight Jones
Chanta Tokela Jordan
Cheryl Whidbee Jordan
Crystal L. Jordan
Robin Jordan-Kight
William Arnold Kight
Sherlante Denise S. Kindred
Kelvin Lamont King
Rickey Edward King

LaToya Janae Knighton
Lemuel A. Lamb, III
Loretta Mae Lane
Gregory Owen Lawson
Richard Dnaiel Levy
Herb Leyland Lewis
Michael E. Lewis
Cory Alonzo Liggins
Marlon Jevon Linton
Isaac Lee Lister, Jr.
Towana LaTeshia Mann
Madana Marshall
Cathy G. McDaniels
Shatrina Nicole McKoy
Chevonne McWilliams
Lakisha Nicole Mills
Chirita D. Mitchell
Davona Tamik Mitchell
Nekita Dorrell Mitchell
Swany Citlalic Mojarro
Shirley Montague
Daminica Jael Moody
Alton Rayvon Moore
Audrey Alice Moore
Craig Brandon Moore
Helen W. Moore
William Patrick Morris
Collier Mullins
Latashia Newsome
Michelle Rontez Nichols
Tamika Shante Nixon
Cynthia Norman
Michelle M. Onell
Frances Lilley Overton
Ivory Shavon Overton
Crystal Dianne Owens
Janell Tyrice Parker
Keyochia L. Parker
Lenward L. Parker, Jr.
Patricia L. Parker
Christopher Ryan Patterson
David Jason Perdue
Victesha Roshane Pettaway
Tanyetta Montre'al Pittman
Aisha Latoya Powell
Jeanime Henri Powell
Tavaras Jarnell Powell

Kristy M. Poyner
Jessica A. Prayer
Mia Darlene Price
Serena Catherine Price
William Bradley Privott
Sylvia Elizabeth Quintero
Latonya Michelle Raynor
Jennifer Rebecca Reinholz
Chanteal Reynolds
Yvonne Ribeiro-Yemofio
Donna Maria Richards
April Marie Richardson
Lawanda R. Richardson
Freita Williams Riddick
Lavone Sharita Riddick
Marcus Westley Riddick
Ronald A. Riddick, Jr.
Katrice Robbins
Jawan Monique Robinson
Sabrina Kimberly Robinson
Chrishanda Anecia Rodgers
Samantha Royster-Cunningham
Buffy S. Ruffin
Crystal Monique Sawyer
Sharonne Tramaine Sawyer
Garrick Devon Scott
Jenny Marie Scott
Kristi Shank
Marcus Albert Sharpe
Travis Antonio Shoulars
Melinda Harrell Simonds
Rosslyn Yvette Smallwood
Cherita Monique Smith
Fatina Marie Smith
Kendra Celia Smith
Leeka Catherine Sock
RaShawn Michael Spencer
Shermae Edwinda Spratley
Kathryn LaShanna Squire
Dyann Wilson Stephens
Arthur Louis Stephenson
Keisha L. Stephenson
Shannon Marie Stephenson
Shauna Jaquay Steward
Tisa Sheree Stiles
Ernest M. Sutton
David Robert Swinney

Owen Danyell Sykes
Virginia Anne Talmadge
Tishania A. Tatem
Khalilah RaJenna Taylor
Laysha Nicole Taylor
Olivia C. Taylor
Lisa Diane Temple
Herbert Michael Thibodeaux
Tashia Esta Tillett
Laquisha A. Tisdal
Catina Pauline Tudder
Tracy Nicole Twiddy
Tishema Yvonne Valentine
Kimeko Vaughan
Shameika T. Vick
Ernest Walker, III
Free Lee Walston, Jr.
Mona Maxine Walton
Holly Hui-Chu Wang
Kelly Elizabeth Ward
Kizzy Dimanda Ward
Tanya Renee Ward
Lasindra R. Webb
Sharonda Monique Wells
Stephanie L. White
Benjamin J. Whitefield
April L. Whitely
Atiba Abdul Wiggins
Chantee Wilkins
Kelsey Kendale Wilkins
Amber Dawn Williams
Aretha Chante' Williams
Christina G. Williams
Shakeeba D. Williams
Zaarenetta L. Williams
Jan Marie Willingham
Brian Christian Willoughby
Kesharra Monique Wilson
John Patrick Workman
Jerri Renita Zachary
Krista Chanel Zeigler
Diane R. Zeuner

Honors Fall Semester 2000-2001

Chancellor's List: 3.75 to 4.0 Average

Jennifer Lyn Adkins
Catina Renee Alston
Branden Germaine Anderson
Rebecca Dawn Armstrong
Connie Lane Ashley
Rayshawn Lamar Askew
Shannon D. Autry
Connie Pendleton Balduf
Charles Henry Basnight, Jr.
Sandra W. Baum
Stephanie Guttu Beaman
Barbara Joan Beck
Amena G. Becton
Leigh Ann Bierman
Cristy S. Binder
Carroll Biondi
Susanne Denise Blevins
Crystal Del'Borah Bloomfield
Kimberly Wannette Bond
Melvin Jevon Bonner
Kathryn M. Bottum
Tonya Brinkley
Rhonda Jean Britton
Leslie Armstrong Brothers
Deborah Comer Bunch
Ruth Ann Burgess
Tremaine Caldwell
Malissa Dianne Carr

Shamika L. Cash
Sandra Marie Cashwell
Karl Bass Chappell
Gamaliel R. Cherry
Rene' Denise Clark
Jennifer L. Clagg
April Denise Clark
Trenette Tyrell Clark
Natasha Shenee' Coley
Charna A. Cooper
Gary Matthew Cooper
James S. Cooper
Audrey Shovone Dance
Royelle Edwarda Davis
Vincent Augustus Davis
Norma Jean DeVita
Gwenette Nicole Dixon
Shannon Aileen Doyle
Phebe Antoinette Eley
Alisa Ann Esposito
Dixie Blanche Estus
Carrie L. Finney
Theodore Paul Finney
David L. Flanders
Joan Eileen Fonville
Michael D. Fournier
Crystal R. Foust
James Williams Fox

Christi Froelich
Jennifer A. Futrell
Demetra J. Gilmore
Tracey Colson Godfrey
Sharon L. Goehring
Valerie Goodwin
Steven D. Gordin
Sharon Gorgani
Dean Joseph Gough
Javon Griffin
Linda W. Grimes
Patty Twiford Halstead
Paula Rene Harrell
Holly Renee Harris
Amber Michelle Hassell
Grantina A. Hayes
Kristel L. Hedgepeth
Marcia Perry Hobbs
Robert L. Holley, Jr.
Heather Michele Hopkins
Curtis Edward Horne
Sherri Genese Horner
Cynthia E. Howington
Benita Earl Hurley
Leverne Jackson
Susan Marie Jones
Tiffany Lynne Jones
Monique Shnee' Joyner

Nicole D. Kaczmarek
Sharon E. King
William E. Krimmel, III
Angela Marie Kurtzwell
Nicole Marie Lavinder
Damian O'Neil Lewis
Maureen C. Liverman
Benjamin L. Long
Casey Maderazo
Billie Jo Anne Malatesta
Heather A. Malone
Courtney E. Markham
Cathy G. McDaniels
Vivian J. McDaniels
Barbara Dale McDermott
Melissa D. McLean
Leslie Michelle McPherson
Joy Lucinda Mcghee
Rhonda H. Meadows
Amyjho Marie Miller
Carrie Elizabeth Miller
Tammy Miller-White
Angela Jeanette Mitchell
Natalie Danielle Moore
Amy Old Morgan
Cynthia Marie Morris
Sheree LaMone Moye
Kimberly A. Newbern

Lisa R. Newbern
Tina M. Noriega
Natasha Hall Norman
Nicole Forehand Overton
Selena E. Overton
Crystal Dianne Owens
Jesseca E. Paige
Richard F. Petersen
Wendilyn Price Pierce
Tara Deleight Pleasant
Tracy Benton Port
Tierra Monique Porter
Carol A. Pressnell
Serena Catherine Price
Sharon Lee Priest
Anne Michelle Raymond
Becky Bruebaker Reeder
Nells Francisco Ribeiro
Kristen Denise Riddick
Sabrina Kimberly Robinson
Cleantha D. Samuel
Shirley Wynne Schoolfield
Ray Edward Seier
Carl William Seward
Amy N. Simmons
Olga H. Simpson
Robin L. Smith
Cynthia Diane Spencer

Dyann Wilson Stephens
Roxanne P. Stewart
Tisa Sheree Stiles
DeTra L. Stith
Donna M. Stockll
Kendra L. Stone
Elizabeth Suderman
Teyona L. Taylor
Tia Nicole Thorne
Sarah Jean Lebow Tolson
Simone N. Uter
Monica Valentine
Amy Roughton Venator
Monica Jane Vrablic
Paulette Myers Wagner
Rebecca Lynne Walker
Nicole Keefe White
Lena A. Whitfield
Cortisha Jennelle Williams
Julie Davis Williams
Anita Lynn Wogoman
Mikel Colette Womack
Christine P. Wright

Vice-Chancellor's List: 3.50 to 3.74 Average

Justin Edward Anderson
Sandra Hines Arnold
Bernard Wesley Bailey, Jr.
Shaunte Laquita Barnes
Linda D. Barrett
Jessica Ann Barrier
Antonio Dewayne Barrow
Sarah Lynn Bateman
Angela Nicole Bembry
Angela Reversal Betts
Jeffery A. Billups
Aleacia Louise Blake
Tameka Roshelle Braswell
Trisha Gail Breeding
Kevin Lee Briggs
Stacy Brock
Nalyhani Cherice Broughton

Dana V. Brown
Julian Brown
Tyshau Lemoan Bryant
Kathryn Dall Burgess
Stephanie Ann Carpenter
Abrian Cherwanda Carter
William Harvey Chappell
Natasha Shontice Cherry
Tabitha Odell Clemons
Rensha Devon Collier
Alice Brewin Cox
Amy Owens Cruise
Charlie Wilson Cuffee
Michelle Marie Culipher
Annette Marie Dixon
Natasha Nicole Faison
Keisha Yvonne Ferguson

Justine Arkell Ford
Willie James Gilchrist
Fitema Arnes Gregory
Patricia Ellen Griggs
Justin L. Grubbs
Takeyla N. Hall
Krystal M. Harris
Bonnie Nicole Higgins
Donna Jean Highsmith
John Richard Hinkle
Joya Naticia Jenkins
Venita Francine Jenkins
Tracie LaWanda Johnson
Crystal Lashaun Johnston
Charles R. Jolley, Jr.
Courtnay M. Jordan
Crystal L. Jordan

Latoya Earleisha Jordan
Casey Yolanda Keyes
Tiffanie Elizabeth King
Chimur Santana Knight
Angelika Loos-Sykes
Allison Hughes Mims
Tonisha Hinton Mozelle
Alicia M. Myrick
Golar F. Newby
Cynthia Norman
Tuan Van On
Devine D. Overton
Frances Lilley Overton
William C. Parker
Christopher Ryan Patterson
Elizabeth T. Rascoe
Shawneque Latice Reid

Patty L. Rennert
Keith O'Brian Richardson
Selma Riddick
Kesse Satterfield
Eva Lynn Shew
Samuel L. Shrader
Janice La'Faye Silver
Alicia Santell Simpson
Damiyon Keith Sledge
Rosslyn Yvette Smallwood
Kacey Lynn Smith
Zenika Shenell Spence
Risha Elizabeth Stallings
Laysha Nicole Taylor
Joseph Anthony Tillett
Tracy Nicole Twiddy
Ernest Walker, III

Kristie Walker
Lakeisha Walton
Christopher B. Warden
Raquita Monique Washington
Cynthia Sue Watts
Michelle Marie White
Wendy L. Whitley
Lavonda Nicole Whitt
Amber Dawn Williams
Aretha Chante' Williams
Craig Lee Woodward
Debbie P. Wrighton

Honor List: 3.00 to 3.49 Average

Tanikia Latishia Adams
Saldah Kin Adkins
Joyce Lashun Allen
Kiana N. Allen
Jannie Lureasa Anderson
Ron Bryant Anthony
Vicky I. Arrington
Mister Askew
Tracey Askew
Russell R. Atstupenas
Ramatoulle Bah
Alexander D. Bailey
Shawndella Monique Baldwin
Carlandus M. Banks
Kelly L. Banks
General Irvin Barrett
Emanuel Leory Basnight, Jr.
Ginjah A. Battiste
Joseph Boyd Batts
Shanique Lynette Beale
LaKesha Shante Beamon
Tennille A. Bennett
Evelyn H. Benton
Kelomi Naomi Berry
Antonio Devon Bess
Kenya N. Bethea
Davida Nikki Bines
Conell Stallings Blount
Onzarla Marcel Bobbitt
Sheanna L. Bonner
Charles P. Bowe
Kina Shanee Bowe
Kristen K. Bowen
Michelle T. Bowser
Thelma Walton Boyce
Curtis Wilbert Braswell, Jr.
Kimberly Alison Bray
Lamika Sahvon Brickell
Tamarah Michea' Bridges
Karen Lee Briggs
Nicholas Thornton Britt
Andrew C. Broome
Tyeshia L. Brothers
Carmen A. Brown
Cartrell K. Brown
Rashaun Takish Bunch
Erica Deivern Burnell
Erica Lakeisha Butts
Willie Eugene Cabarrus
Ann Janette Cahoon
Angalika Johanna Cameron

Jeffifer Lynn Campbell
Tenille Wynette Capehart
Grace V. Carter
Kimberly Michelle Carter
Dennis R. Chapman
Athena Chasteen
Catreina Dinnete Cherry
Brandon J. Christian
Greg O'Neal Clemmons
Kendra Monique Cobb
Monica Lukeisha Cofield
Argyle J. Collins
Joynell T. Collins
Damian Alphonso Conyers
Crystal Joye Cooper
Loren Partice Cooper
Mark Stephen Cooper, II
Ebony Michole Copeland
Tyrisha Copeland
Candace Dae Cosgrove
Quentona Felice Cothran
Charles L. Cozart
Christopher M. Crawford
Russel A. Crute
Anna K. Cuningham
Denita Cherell Dalton
Jamaal A. Daniel
Dedrick M. Daniels
Rebecca Ann David
Crystal D. Davis
Kendrick D. Davis
Kindred Dwayne Davis
Bryant L. DeShazo
Sabrina L. Dillard
Sharlena Downing
Kimberly T. Edwards
Latoya S. Eley
Philip James English
Jovan Minita Everett
Kimberly Marie Farless
Angela Mary Farrow
Jennifer Leigh Ferrell
Candace Monique Fisher
Kodi O. Fleming
Jewell R. Foote
Jay N. Ford
Takisha Lamen Frost
James Futrell
Warren Sebastian Gibbs
Osvaldo E. Gonzalez
Omar Ulysses Gordon

Thurman Brian Gray
Wyconda D. Gray
Kimberly Green
Susan E. Green
Kinisha Denelle Greene
Torie R. Greer
Alaina Aurthell Griffin
Tamika R. Groves
Edward Hall, Jr.
Jason L. Hall
Malcolm Frederick Hall
Lea Jacquelyn Hankerson
Amanda G. Harrell
Lawrence Allen Harrell
Wynet Vernesia Harrell
Gail Mercer Harris
Keisha Lashaun Harrison
Lonnel R. Harrison
Barbara A. Healy
Heather Rose Hebrew
Richard Preston Hewlin, Jr.
Jonathan Travis Hill
LaToya LaShelle Hilliard
Richard Allen Hodges, Jr.
Karen J. Hoffman
Jabari Dronde Holder
Francis M. Holley
Kristal Jade Holley
Lorraine Marie Holley
Rhonda Lolita Holmes
Tiffany Renee Hopson
Jack Bennie Horton
Laura Nicole Houston
Jade J. Hughes
Roberta A. Hughes
Richard William Jackson
Jenae Lashelle James
Marcia Sutton James
Sholonda Tawana James
Sandra C. Jefferson
Travis E. Jennings
George M. Jerman, Jr.
Steve A. Jernigan
Jobina Lee Johnson
Travious LaQuanda Johnson
Danielle Katnece Jones
Ja'Tame V. Jones
Kimberly Yvette Jones
Nina Shearon Jones
Tahquetta Avarez Jones
Courtney Leigh Jordan

Terran Rahkenya Jordan
Wyatt R. Jordan, III
ASndreas Ricara Kersey
Sherlante Denise S. Kindred
Rickey Edward King
Susan Virginia Klyver
Jerry Tinsely Lane, Jr.
Loretta Mae Lane
Bernice L. Lee
Camico D. Lee
Aisha R. Lewis
Roxanna Perry Lewis
Darlene B. Littlejohn
Wendy O. Lowe
Emma L. Luckey
Kendrick Antwan Lynch
Betsy Manfield
Mark Anthony Martin
Anna Goodwin McCarthy
Erica L. McNeil
Kimberly D. McPherson
Kimberly Deanne Meredith
Lakisha Nicole Mills
Chirita D. Mitchell
Jason Andrew Mitchell
Nekita Dorrell Mitchell
Wayland W. Mitchell, Jr.
Shayvonna Mizelle
Swany Citlalic Mojarro
Miriam N. Mojarro-Quintero
Daminica Jael Moody
Amber Crystal Moore
Audry Alice Moore
NaeTonma Shamel Moore
William Patrick Morris
Latashia Newsome
Levar Newsome
Michelle Rontez Nichols
Adam L. Nixon
Tamika Shante Nixon
Lauren A. Odom
Abimbola Ogunnaike
Inger Leverdia Parker
Reggie Lionell Parker
Sakina Lashay Parker
Shanyell M. Parker
Brockarte Julius Parkinson
Danny Jermaine Person
Peter John Peserik
Victesha Roshane Pettaway
Kecia Deneen Phelps

Ellen M. Phillips
Michelle A. Pointer
Reginald T. Ponton
Kevin Dewayne Pope
Jennifer F. Powell
Kristy M. Poyner
William Bradley Privott
Jermaine D. Purdie
Marcus Ralph
Brenda Katrice Rawls
Latony Michelle Raynor
Anthony J. Razor
Robin Latriece Reese
Jennifer Rebecca Reinholz
Yvonne Ribeiro-Yemofio
Donna Maria Richards
Crystal L. Riddick
Erika Spellman Riddick
Freita Williams Riddick
Marceller R. Riddick
Adrian J. Roberson
Cynthia Akita Roberts
Tremaine Lewanna Roberts
Bonita Jeanne Robinson
Edwin K. Rousseau
Sharita Monique Saunders
Trisha Bundch Sawyer
Heidi M. Schultz
Aliesha Deshau Scott
Garrick Devon Scott
Jenny Marie Scott
Monica Densie Sessoms
Shawn A. Sexton
Kristi Shank
Chonda Denise Sheard
Kimberly Dawn Shearin
Travis Antonio Shoulars
Deidra Shenel Silver
Melinda Harrell Simonds
Crystal Deon Simpson
Cynthia Ann Simpson
Regina Elizabeth Simpson
Jason Carroll Small
Beshelya D. Smith
Bradley Keith Smith
Kristen M. Snead
Leeka Catherine Sock
Latoya L. Spence
Angel Spencer
RaShawn Michael Spencer
James E. Spivey

Quinnesha Nicole Staton
Tamela L. Stith
Barbara B. Sutton
Lashika Sutton
Shameka S. Sutton
Lori Jane Tallman
Kymber Lee Taylor
Lisa Diane Temple
Felecia Anette Tetterton
Herbert Michael Thibodea
Londrea R. Thomas
Monica Lorraine Tillett
Melitta Hodge Turley
Jasmine S. Turner
Patrice L. Turner
Tiffany Valentin
Tishema Yvonne Valentine
Kimeko Vaughan
Nelson D. Veale
Deborah Ann Vines
Andrew L. Vinson, Jr.
Kevin Jemar Wade
Nicole Lynette Walker
Tiffany Tosheviba Walton
Kelly Elizabeth Ward
Linay Francine Ward
Tanya Renee Ward
Teresa Blanchard Ward
Lasindra R. Webb
Sharonda Monique Wells
Airiel L. Whitaker
Floria Demeka Wiggins
Aaron Clinton Wilkins
Chantee Wilkins
Penda R. Wilkins
Christina G. Williams
Christina Shannon William
Frederick L. Williams
Jordan D. Williams
Marcus D. Williams
Jan Marie Willingham
Takia P. Winrow
Holly Rene' Winslow
Richelle Marie Woodward
John Patrick Workman
Chaquelia S. Worthington
Krista Chanel Zeigler